Research Cards Year 5

Research cards can be laminated and used for individual pieces of research.

It is not necessary to follow through the pages in order.

This means that in a class of 30, a few sets can be prepared and shared around.

Students can work together in pairs.

Research topics

God is Love: Communication
God is Provider: Rainforests; Trees
God is Pure-Holy: Fitness and food choices
God is Creator: Insects; Living Things; living & non-living; reptiles
God is a Servant: Occupations
God is Protector: The History of Shelter
God is Truth: Gravity & Pendulums

Communication 1

1. What is communication?

Not long after you were born you began communicating with others. How did you do this?

How do you communicate with your friends now?

Write down all the different ways we can communicate in our world today. Draw some.

When God created people He created them different to the animals. He created them with the ability to communicate with Him. (Genesis 1:26)
How does God communicate with us?

Communication 2

Communication breakdown

What happens to communication when two people argue?

Often people decide not to speak to the person they have had the argument with. This is called a breakdown in communication. How could this breakdown be fixed?

How do communication breakdowns start?

How could we avoid having communication breakdowns?

At one time the whole world spoke the same language, but God decided to change people's languages when they were trying to build the largest tower in the world. It was called the Tower of Babel, (Genesis 11). Instead of one language there were now many different languages. People who spoke the same language joined together and traveled to different parts of the earth. They settled in different places and became different people groups.

Name five different languages and the countries where you would hear these languages spoken.

Speech or language is a very special and important gift from God. We need to make sure that the things we say, and where possible, the things we listen to, bring honour and glory to God.

Bible verses to look up:
Colossians 4:6 What does it mean to have your conversation full of grace?

James 3:9-10 How can we use our tongue for good and for bad?

Communication 3

Learning to speak a language

When you were very young you learned to speak very easily.
How did you learn to speak?

Learning a second language

For some people, understanding a language might be very difficult.
Who do you know who cannot speak these languages?
Fijian, English, Hindi

Imagine that you could speak both Fijian and English. There is a student in the school who can only speak Fijian. How could you help that person?

Find out:

How many different languages are spoken in your classroom?

Communication 4

Using good manners in communication

1. Your best friend has asked you to come and play at their house after school. You have said, “yes”. But when you get home you find out that Mum has asked you to help her with the supermarket shopping.

Why should we communicate?
How could we communicate?

2. You have been invited to a birthday party on Saturday but your family is going away for the weekend and you have to go with them.

Why should we communicate?
How could we communicate?

3. You are in a sports team that is playing on Saturday, but you have fallen over and broken your arm.

Why should we communicate?
How could we communicate?

Communication 5

The history of the telephone

On a sheet of paper draw a timeline showing these dates and what happened.

1876 – first phone Alexander Bell

The first telephone was invented by Alexander Graham Bell. The first telephone communication was made when Bell spoke to his assistant Thomas Watson by wire on the 10th of March in 1876.

1888- first pay phone

William Gray created the first pay telephone, which people would use by putting coins into slots.

1947- idea of a mobile phone

A person called Dr. Ring thought of the idea of cell phones, but the technology did not yet exist to be able to make one.

1962- push-button phones

Push button, or touch-tone telephones were first seen and sold.

1973- first mobile phone

This was the year of the first mobile phone, (called a cell phone in the USA).

1983- Mobile phones for the public

The first commercial mobile telephone system was opened.

1992 – first smartphone

Cost $1000 in the USA

Communication 6

- Draw these phones. They go from oldest to newest.

1. How do you use the first phone?
2. What would the winder be used for on the second phone?
3. Why is the cord coiled in the fourth phone?
4. Why do phones 1 to 5 have cords but the mobile phone (no.6) has no cord?
5. How has the mobile phone changed since it was first invented? (What can Smart phones do?)

Communication 7

What is the difference between mobile phones and land-line phones?

Land lines

- carry calls along electrical cables
- The words you speak travel down a wire connected between two handsets.

Mobile phones (cell phones)

- can send and receive calls without wire connections of any kind.
- use radio waves in the air

Write down some good points about a mobile phone.

Write down some bad points about a mobile phone.

Write down some good points about a landline phone.

Write down some bad points about a landline phone.

Communication 8

Science experiment: telephones

What you'll need:

- 2 paper cups or two empty tin cans
- A sharp pencil or sewing needle to help poke holes, (or hammer and nail if you use cans)
- String (fishing line also works well)

Instructions:

- Cut a long piece of string. You can experiment with different lengths but perhaps 20 metres (66 feet) is a good place to start.
- Poke a small hole in the bottom of each cup.
- Thread the string through each cup and tie knots at each end to stop it pulling through the cup (alternatively you can use a paper clip, washer or similar small object to hold the string in place).
- Move into position with you and a friend holding the cups at a distance that makes the string tight (making sure the string isn't touching anything else).
- One person talks into the cup while the other puts the cup to their ear and listens; can you hear each other?

What's happening?

Speaking into the cup creates sound waves which are converted into vibrations at the bottom of the cup. The vibrations travel along the string and are converted back into sound waves at the other end so your friend can hear what you said. Sound travels through the air but it travels even better through solids such as your cup and string, allowing you to hear sounds that might be too far away when traveling through the air.

Communication 9

Communication through writing

People in early times used to communicate through pictures. Chinese writing is made of pictures and is still used today.

Example of Chinese writing:

Here is the Chinese word for a large boat. Notice that it is made of 3 pictures: a vessel (boat), eight and people. This means that the Chinese people knew the story of Noah. In the ark there were eight people: Noah and his three sons and their wives.

Egyptian writing was made up of symbols for objects and simple sounds. It was called hieroglyphics, (hi-ro-glif-ics). The Egyptians invented a type of paper that they made from plants. It was called papyrus. It was a bit like the Fijian tapa which is made from cloth.

The first books were written by hand. Bibles were written by hand. Then in 1440, in Germany, the printing press was invented so that more and more books could be printed. One of the first books printed was the Bible.

How did people in early times communicate?
How were the first Bibles written?
How do we use writing to communicate today?

Communication 10

Communication through music and art

Music

Name a song that communicates a message. What message does it communicate?

Can drums communicate a message? What message can a Lali communicate?

What messages do war cries of sport teams communicate?

Art

Think about signs and symbols. What do they communicate?
We see art work when we go to the supermarket. What does the packaging tell us about the product?

Project

Design a page of symbols that represent you: family, interests, and pets.

Communication 11
Communication by computer

Computers can perform many helpful functions but do not have the intelligence of a human being. Everything that a computer does has to be programmed into it. The ‘cleverest’ computer that a man can make is really nothing compared with human beings. We are God’s special and most wonderful creation.

Use these dot points to explain how we use computers to communicate.

- Ask questions and get answers
- Type text and print it out
- Find pictures to use in our projects
- Send emails

(Write in whole sentences.)

Communication 12
Communication for the disabled: blind and deaf

Some people in our community experience real communication problems because they are blind or deaf.

How would you describe a colour to someone who had been blind from birth?

What would it be like to be blind? How would you find out what things are like? What are some of the things you could not enjoy?

Braille – a language for the blind
In 1824 a Frenchman, Louis Braille developed a reading system for blind people. Each letter is made of dots in patterns punched into thick paper. These dots can be felt. If blind people learn what the Braille letters mean, then they can read books.

How could you help a blind person enjoy a story from a book?

Sign language for the deaf
Many deaf people communicate using a language of facial expressions and hand symbols.

What is another way that many deaf people use to understand what is being said? (clue: lips)

Rainforests 1

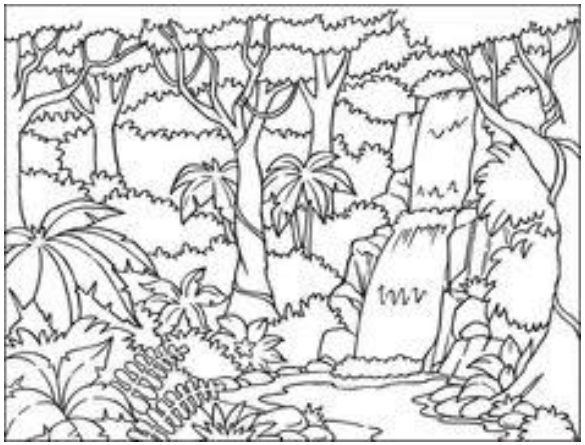
What is a Rainforest?

On the outside, a rain forest has a wall of about 6 metres (20 feet) thick that is made of a tangle of vines that love light.

This wall is very thick on the outside and it looks as if the whole jungle is this thick. But inside this wall you will find animal paths or a stream to follow. It is like entering another world.

Once you're inside, you can look up and see a tree canopy that's as high as a 17 storey building!

It’s fairly dark inside the canopy. Only 1% of the sunlight ever actually gets to the floor of the forest because of the tall trees above. And moonlight, even a full moon, doesn't get through at all.



1. What makes up the outside wall of a rainforest?
2. What might you find inside this wall?
3. Why do you think it is dark inside the rainforest?

Rainforests 2

Plants of the rainforest

Draw a picture showing these plants:

- **Trees** grow tall as they push their way up to get the light.

The tallest trees in the rainforest grow up to 60 metres (200 feet) high. The tall trees that poke through are called the *"emergents".* They make an umbrella that can cover an entire acre.

The soil on the rain forest floor is rich in nutrients, but only 100 cm (4 inches) deep with red clay beneath it. This causes the trees to have very shallow roots. That's why many tall trees have buttresses or extra trunks supporting the first one around the bottom. These *buttresses* help stabilize and hold the tree up, like a set of crutches.

- **Stranglers** are plants that grow on a tree as a parasite plant.

The stranger plant grows up the tree and the tree dies. The strangler plant tree now keeps growing around the dead tree.

- **Vines** grow around and around other trees. They use little hooks called tendrils to hold on to trees.

- **Tree ferns** grow out from trunks of trees to catch light and water. They have broad leaves, which grow into the shape of baskets. They can catch water in the baskets.

- **Lichens, mosses and fungi** grow on other plants. They grow on trees to get sunlight.

Rainforests 3
Layers of a rain forest

Rain forests have different layers that support different animals and insects. Some plants and animals live in specific layers, while others live and feed wherever they can.

EMERGENT LAYER
The tallest trees are the emergents, growing high as 60 metres (200 feet) above the forest floor with trunks that measure up to 5 metres (16 feet) around. Most of these trees have broad-leaves. Sunlight is plentiful up here. Many animals can be found here.

CANOPY LAYER
This is the main layer of the forest and forms a roof over the two remaining layers. Most canopy trees have smooth, oval leaves that come to a point. Many animals live in this area since food is abundant.

UNDERSTORY LAYER
Little sunshine reaches this area so the plants have to grow larger leaves to reach the sunlight. The plants in this area seldom grow to 4 metres (12 feet). Many animals live here

FOREST FLOOR
It's very dark down here. Almost no plants grow in this area. Since hardly any sun reaches the forest floor things begin to decay quickly. A leaf can decompose in just 6 weeks.

Draw a rainforest showing the different layers.

Rainforests 4
People of the rainforest

Some very interesting people live in the rain forest of Papua New Guinea. They are called the *Huli Wigmen* tribe. The men of this tribe wear large wigs of matted human hair, that they grow themselves. They must stay in a special "school" in the forest for up to three years while their hair grows. This school is a group of huts in the rain forest surrounded by tall wooden fences. Every day the men sprinkle special water on their hair and use twigs and rope to shape the wig. Once it has grown bushy enough, they shave their heads. Then they use natural dyes found in the rain forest to colour their wigs red or black. They decorate them with flowers, leaves, shells, bones, feathers, and fur that they also collect from the rain forest.

Many of them have two wigs, one for wearing everyday and one for ceremonies. When they dress up, they paint their faces with juice from berries and rub pig fat over their bodies. Then they put big bushy leaves in woven belts to make a skirt and dance in a big circle. They'll usually invite other tribes from the area to join them. The wigmen can be very fierce, so these dances are a good way to build friendships with other tribes.

1. Where do the wigmen live?
2. What do the wigmen do at their school?
3. What are the two wigs used for?

Rainforests 5
Where are rainforests found?

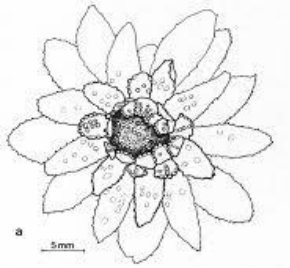
South America, Central Africa, India, South East Asia, Papua New Guinea and the South Pacific Islands.

Rainforests of the South Pacific
South Pacific Islands with rainforests are:
American Samoa, Cook Islands, Fiji, French Polynesia, Niue, Samoa, Tonga, Wallis and Futuna Islands

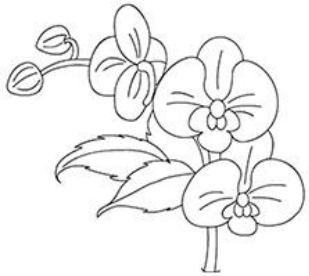
Draw a map of the South Pacific and name the islands with rainforests.

Rainforests 6
Rare plants of the Fijian rainforest

In Fijian rainforests you can find a species of tree called Degeneraceae. This is a flowering tree related to magnolias, and only grows in Fiji. Look at the pictures below and draw a picture of this tree.



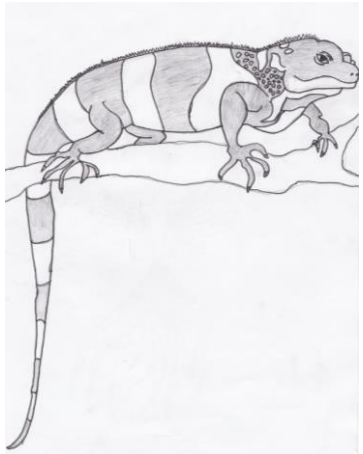
The Fijian rainforest is also a home for different kinds of orchids. They come in pinks, purples and yellows. Draw some of these.



Rainforests 7

Animals of the South Pacific rainforests

- Iguanas, including the Crested Iguana (now endangered)
- Orange dove
- Red shining parrot
- Fruit bats including the Fijian monkey-faced flying fox
- Snakes
- Geckos
- Frogs



Banded Iguana (green and blue)

Crested Iguana (blue or green)

Draw and name five animals of the Fijian rainforest.

Rainforests 8

Our vanishing rainforests

The world's rainforests are currently disappearing at a rate of 6000 acres every hour (this is about 4000 football fields per hour). When these forests are cut down, the plants and animals that live in the forests are destroyed, and some species are at risk of being made extinct. As forest trees are cut down on a large scale, the balance of the earth's eco-system is disrupted.

We need the rain forests to produce oxygen and clean the atmosphere to help us breathe. We also know that the earth's climate can be affected, as well as the water cycle. Rainforests also provide us with many valuable medicinal plants, and may be a source of a cure from some deadly diseases.

As a world community, we must be careful not to destroy the resources that people will need in the future.

Many animals are illegally taken from rainforests and sold in other countries. Parrots and iguanas, for example, are often imported illegally. We should not buy these animals, since that encourages other people to bring in more animals.

Many products, such as rubber, coffee and timber come from rainforests. Rainforests are cut down to harvest the timber and also to make room for farms to grow coffee and spices. Each of us needs to be thoughtful about the way we consume these products. Recycle and re-use whenever possible, and help keep the earth green and healthy.

Why are rainforests so important?
How can the world's rainforests be protected?

Trees 1

What does a tree need?

Did you know that trees can teach us about God?
A tree is very strong, but it needs a constant supply of certain things from God's creation in order to stay strong.

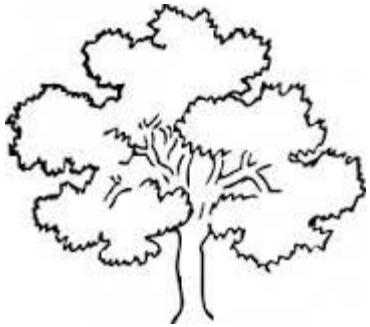
Draw a picture of a tree and show how it needs the following things:

- Sunlight
- Nutrients from the soil
- Air
- Water

Sometimes, when there is a serious drought that goes on for a long period, a tree can die. A tree can also die if it gets too much water. If an area becomes flooded, and water surrounds the roots for a long time, the tree will die because the roots cannot get air.

To stay alive, a tree must have a constant supply of the life-giving resources from God's creation.

What does a tree need to stay alive?
What happens when a tree does not get the things it needs?



Trees 2

The Grape Vine

Jesus told us that as Christians, we are like trees. In order to stay alive in our relationship with Jesus, we must stay connected to Him. Jesus gives us the things we need.

Jesus is the living water. A tree needs water. We need the living water to keep our relationship with Him alive.
Read the story of Jesus and the Samaritan woman in John 4.
What is special about the water that Jesus gives? (verse 13)

Jesus said, "I am the Vine, you are the branches." A grape vine is a kind of tree. We have to stay connected to the strong part of the grape vine. Jesus is the strong part of the vine. When we stay connected to Him we will have eternal life.

Read about the Jesus, the Vine in John chapter 15.

1. What do we have to do to stay healthy in our relationship with Jesus? (verse 5)

2. What happens to those who do not stay connected? (verse 6)

3. What kind of life is Jesus offering?

Trees 3
A tree planted by the water

Psalm 1 says, “Happy are those who reject the advice of evil men, who do not follow the example of sinners. Instead they find joy in obeying the law of the Lord, and they study it day and night. They are like the trees that grow beside a stream, that bear fruit at the right time, and whose leaves do not dry up. They succeed in everything they do. “(GNB)

1. What do you think the water in the stream represents?

2. What are the benefits of having your roots on the bank of the stream?

Psalm 92:12-14 says, “The righteous will flourish like palm trees; they will grow like the cedars of Lebanon. They are like trees planted in the house of the Lord, that flourish in the temple of our God, that still bear fruit in old age, and are always green and strong.” (GNB)

3. Name two trees mentioned in these verses.

4. What are the benefits of being planted in the House of the Lord?

Trees 4
Parts of a tree

1. Make a drawing of a tree big enough to fill half a page. Write the names of all the parts. Use arrows. Here are the names of the parts of a tree.

trunk roots leaves branches bark twigs

2. There are some parts of the tree that we only see sometimes. Add these to your drawing

- fruit
- nuts
- sap
- berries
- cones

Trees 5

The leaves

The leaves have a special work to do. They make food for the tree. They use sunlight and water and a special gas called carbon dioxide from the air to make sugar. We can see this sugary food on trunks sometimes. It is called sap. It looks like syrup. The leaves have another important job to do. They give out oxygen to the air.

1. What is the special job of the leaves?
2. What do the leaves need to make the food?
3. What does the food look like?
4. What else do the leaves do?

Trees 6

The roots

The roots have a special work to do. They hold the tree in the ground. They also take water from the ground and send it up to the leaves. The leaves need water to make food.

The trunk

The trunk has a special work. It carries food and water up and down the tree. It has little tubes that act like the veins and arteries in our bodies.

The branches

The branches have a special work. The leaves fruit, flowers and nuts grow on them. They must be strong!

Why are the roots important?
What does the trunk do?
What is the job of the branches?

Trees 7

Festival of Fruits

The Jewish people have a festival each year to celebrate the fruits produced by their trees. When a tree matures it produces its first fruits.

Jewish people give thanks to God each year for the first fruits of the trees of Israel. These fruits are oranges, raisins, figs, dates and carobs.

The festival is called Tu B'Shvat. They recognize the importance of trees by planting new trees planting in the desert areas. The children are told this story, to help them understand how important trees are. Here is the story:

The king was riding through the countryside, when he noticed an old man planting a tree.
"What are you planting?" he called.
"A carob tree," replied the old man.
"How long will it be before your tree bears fruit?" asked the king.
The old man shrugged his shoulders. "Maybe seventy years," he replied.
"And how old are you?" the king said.
Seventy years old," was the answer.
"Do you expect then, to eat the fruit of that tree you are planting?"
"Oh no!" answered the old man.
"But I when I was young there were many fruit trees and plenty of fruit for me to eat. The trees were planted by people in the past. So I plant trees, so that my children's children may eat fruit too."
What can we learn from this story?

Trees 8

Trees of the world

Trees grow all around the world.
Some trees grow where it is hot. Some trees grow well where it is cold.

Many countries have summer and winter seasons, where it is hot in the summer and cold in the winter. It would be too cold for the leaves of many the trees to stay green. So these leaves turn yellow, red and brown before winter, and fall to the ground. Then the tree has no leaves for the winter. But that is alright, because when the spring comes, the tree grows new leaves. God has made it that way.

There are some trees that grow perfectly well in the snow. These are pine trees. They have thin needles that can survive the snow. They do not lose their leaves. You have probably seen a pine tree. A Christmas tree is a pine tree.

Leaf shapes
Trees have leaves of many different shapes.
Draw some different shaped leaves.
You could also do some leaf rubbings.

Draw a pine tree.
Draw a tree that has lost its leaves for the winter.
In which country might you find this tree?

Fitness & food choices 1

Choosing healthy foods

Draw a healthy breakfast.

Try to choose foods other than packaged cereals. Here are Some foods you might choose:

fresh fruit
porridge
milk, yoghurt
egg

Now draw a healthy school lunch.

Try to include:
vegetables
fruit

Draw a healthy home-cooked main meal:

Here are some foods you might choose:
potatoes or yams
rice
fish
meat
cooked vegetables
raw salad vegetables
lentils (dahl)
cooked dried beans (legumes)

Fitness & food choices 2

Can you help?

Here is a list of food that a boy eats in one day. Make a new list for him, giving some suggestions for improving his diet. Also think about how much water he should be drinking.

Breakfast
1 glass of chocolate milk
2 slices of white toast with jam

Mid-morning
2 sweet biscuits
1 fruit juice in a packet

Lunch
sandwiches made with white bread
2 sweet biscuits

After school
Fizzy drink
1 packet potato crisps

Evening meal
1 pizza from the shop
1 serving of hot chips
1 corn on the cob
1 piece of cake

Fitness & food Choices 3
8 rules for fitness: NEW START

Nutrients: Choose foods that as close to nature as possible.

Exercise: Exercise is good for our heart. Fast activity gets the heart pump rapidly and gets blood flowing around our body faster. Exercise is also good for building muscles and strengthening our bones.

Water:
Drink 6 glasses per day. Drink less fruit juice and keep fizzy drinks for only very special occasions.

Sunlight:
We need sunlight for vitamin D, which makes our bones grow strong.

Toxin-free:
Choose foods and drinks that contain no artificial chemicals like colours, flavours or preservatives.

Air: Play outdoors and get plenty of fresh air.

Rest: Go to bed early. Don't stay up late. The body needs sleep for growth and good health.

Think happy thoughts and trust in God. Bad thoughts, like anger, hatred and unforgiveness will make us feel unhappy and stressed.

Fitness & food choices 4
NEW START QUIZ

1. Name a healthy energy food.
2. Name a healthy food for building muscles.
3. Why do we need to eat a variety of fruit and vegetables?
4. Why do we need to exercise?
5. Name three exercise activities.
6. How many glasses of water should you drink per day?
7. Why is water the best drink?
8. Why do we need sunlight?
9. Name two foods that could contain artificial colourings or flavourings.
10. Name two foods that contain no artificial food additives.
11. Why do we need fresh air?
12. Name two ways to provide the body with fresh air.
13. Why should we avoid staying up late?
14. What does sleep do for the body?
15. Why should we think happy thoughts?

Fitness & food choices 5
Fats

There are good fats and bad fats

Good fats

The best fats are straight from nature. We get good fat from butter, fish, meat, nuts and coconuts.

Bad fats

The bad fats are the ones that have been processed in a factory.
These are:
Margarine
Cooking oil in plastic bottles

Margarine and cooking oil from plastic bottles can create toxins in our bodies. Toxins are poisonous substances. Now you may be thinking that these toxins would make you sick. Actually, they don't make you feel sick. The amount of toxins you take into your body with bad fats in one meal might be very small, and your body doesn't notice it straight away. However, after a long time, the toxins build up, and can cause health problems.

Where do we find them?
In the supermarket: margarine and bottled cooking oil
In processed foods such as chips, crisps and pastries

List some good fats

List some bad fats

Fitness & food choices 6
White table salt

White table salt, used in most foods that we buy, is called refined salt, and contains no goodness. That's because it has been processed in a factory. It actually contains chemicals that are not good for our bodies. It is important not to eat too much salty food.

Where do we find white table salt?
Apart from on the table, we find it in packaged food like potato crisps, most breakfast cereal, tinned foods, cracker biscuits, bought bread, tomato sauce, hamburgers, sausages, hot dogs and many other foods.

What can I eat instead?
Make your own healthy snacks. If you make your own food, then you can use less salt.

1. Name some processed foods that contain lots of salt.
2. List some healthy snack foods that you could make or buy.

Fitness & food choices 7
Sugar

Sugar comes from sugar cane. If we could cut the sugar cane and such the sugar from the cane, we would be getting some healthy nutrients.

But the sugar we buy from the supermarket has been processed. This type of sugar is called refined sugar, unlike the sugar you would find naturally in a piece of fruit. Refined sugar is made out of the liquid cane sugar. It has been heated and cooled until crystals are formed. These sugar crystals now have no nutrients. Sugar also causes tooth decay.

Our bodies have to work hard to break down refined sugar. People who eat a lot of sugar have less energy and can catch colds more easily. Sugar causes people to gain too much weight. Too much sugar causes diabetes.

Where do we find it?
Refined comes in three types, white, brown and raw. It is found in sweet foods and soft drinks and packaged fruit drinks. It is also added to many processed foods, even tinned food and bread.

What can I eat instead?
Eat fruit in which there is natural fruit sugar. The body can use this type of sugar more easily. You can also eat a little honey, but remember to clean your teeth because all sweet things can promote tooth decay.

1. Give two reasons why sugar is not good for health.
2. Think of some supermarket foods that contain sugar.
3. List some supermarket foods that don’t contain sugar.

Fitness & food choices 8
Choose the healthy foods

Write down the foods that contain **no** refined salt, no processed sugar, and **no** bad vegetable oils.

sausages apples bananas dried beans home-cooked-meat potato crisps

hamburgers carrots coconuts pumpkin potato rice margarine

tinned soup biscuits ice-cream cheese home-cooked-fish avocado

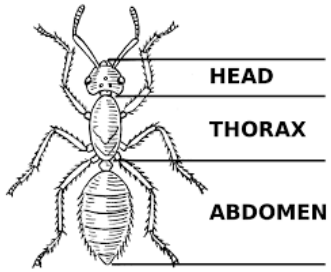
Packaged breakfast cereals
Packaged breakfast cereals contain added sugar and salt. It tells you this on the packet.

Traditional foods are much better than packaged cereals and bread. For example, eggs, fish, rice, vegetables, dhal.
If the cereal contains:

Write a list of healthy foods that your family could eat for breakfast.

Insects 1
What are insects?

- An insect has 3 parts: a HEAD, a THORAX and an ABDOMEN



- All insects have 6 legs
- On the head there are 2 EYES and 2 FEELERS.
- There are breathing holes along both sides of the abdomen.
- Most insects have WINGS. These are joined at the thorax.

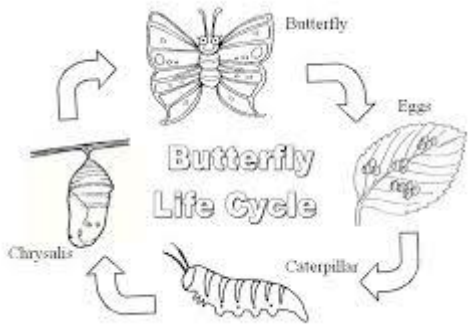
Draw a large diagram of an insect and label the parts.

Make a list of all the insects you know and draw them.

Write down which of these are NOT insects.
☐ butterfly
☐ snail
☐ ant
☐ worm

Insects 2
Butterflies are insects.

Draw the life cycle of a butterfly.
A butterfly's lifecycle is made up of four parts: egg, larva (caterpillars), pupa (chrysalis) and adult butterfly.



Butterflies attach their eggs to leaves with a special glue.

Most caterpillars are plant eaters (herbivores).

Fully grown caterpillars attach themselves to a twig or leaf. Then they shed their outside layer of skin. The hard skin underneath is called a chrysalis.

After some time, an adult butterfly will come out from the chrysalis.

Butterflies have four wings.
Most butterflies feed on nectar from flowers. They taste through their feet!

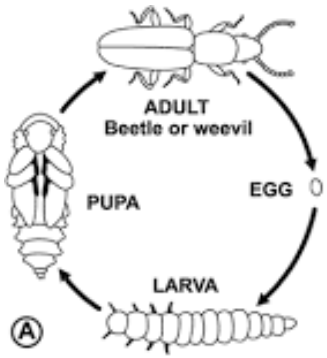
Insects 3
Beetles are insects.

Beetles come in a lot of colors. They can have stripes or spots.

Beetles live everywhere – from hot deserts to the polar ice caps.

Most beetles have protective defenses to defend themselves against predators. Some squirt out acid and some are poisonous.

Beetles start as eggs and hatch into larvae. The larvae look like little worms. They're sometimes called grubs. Later, beetles enter a pupa stage and become adult beetles.



Draw some beetles that you have seen. Write 3 facts about beetles

Insects 4
Moths are insects

What's the difference between butterflies and moths?

Butterflies are usually more colorful and larger, though not always.

Butterflies have rounded knobs or clubs at the ends of their antennas. Moths do not. Moths have feathered antennas.

Moths are often nocturnal. Butterflies appear during the day.

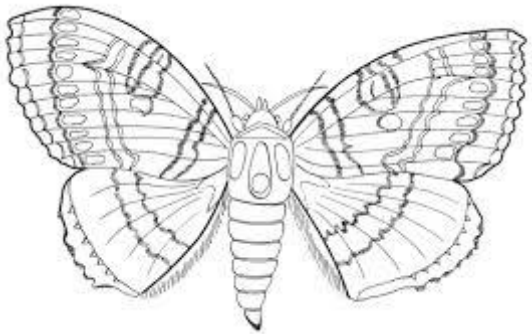
A moth's wings are spread out when at rest. A butterfly's wings are straight up and together when resting.

Moths have a thick body. Butterflies have a thin body.

Draw two pictures to show the difference between a moth and a butterfly.

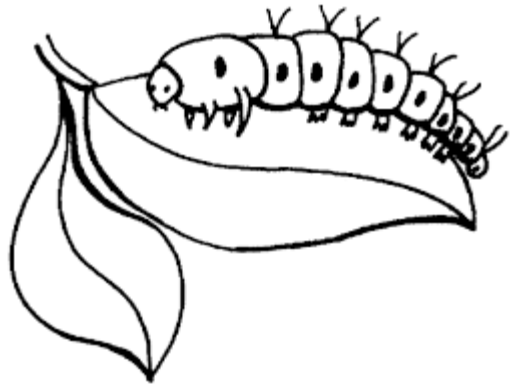
Insects 5
Moths and butterflies

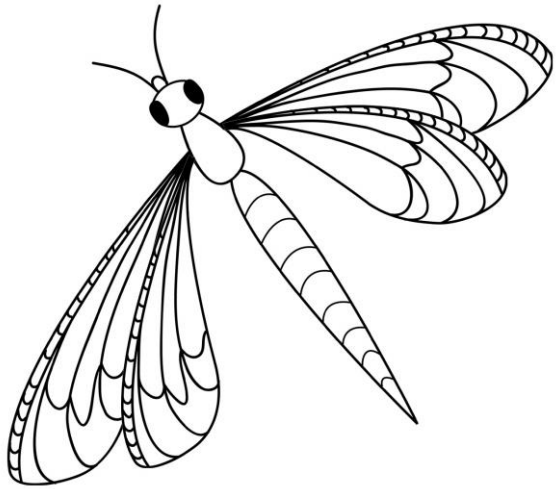
A moth is an insect
A butterfly is an insect.
Draw a moth and a butterfly.

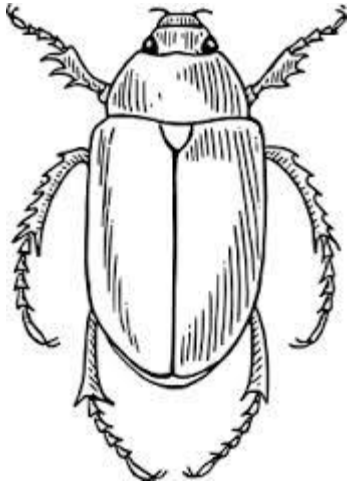


Insects 6
Dragonflies and beetles

A dragonfly is an insect
A beetle is an insect.
The caterpillar will be an insect soon!
Draw a dragonfly and a beetle.

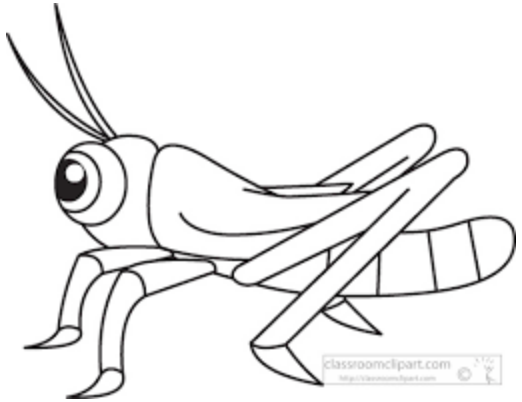






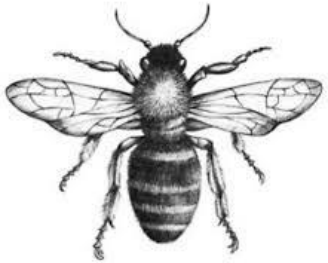
Insects 7
Grasshoppers and cockroaches

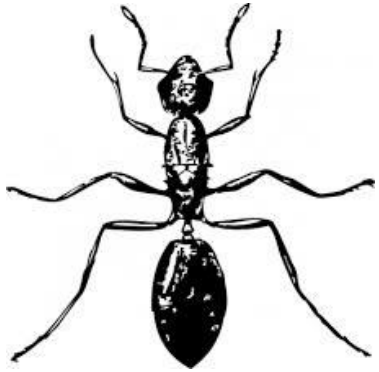
A grasshopper is an insect.
A cockroach is an insect.
Draw a grasshopper and a cockroach.



Insects 8
Ants and bees

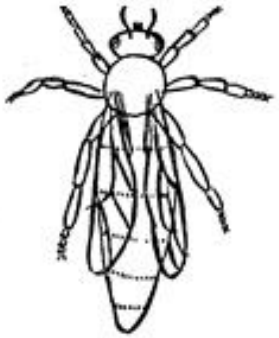
An ant is an insect.
A bee is an insect.
Draw an ant and a bee.





Insects 9
The members of the bee hive

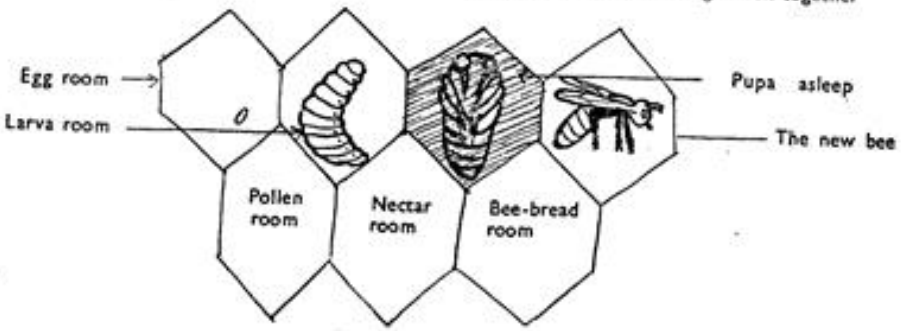
Worker Bee



Queen Bee

Drone Bee

How front and back wings hook together



The different rooms in a hive

Insects 10
Insect homes

Insects live:

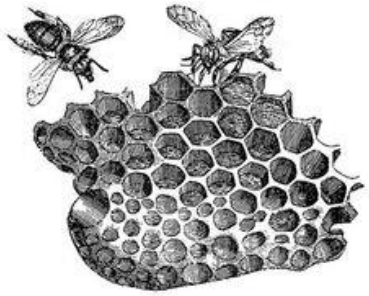
- in hives
- in holes
- on plants
- on the ground
- under rocks

Rocks help them star cool and safe from their predators. Predators are other animals that want to eat insects.

Grasshoppers live in grass. They are the same colour as the grass. This helps them to hide.

Some ants build big hills for their home.
Termites do this too.
The hills can be very big!

Bees work together to make a hive.



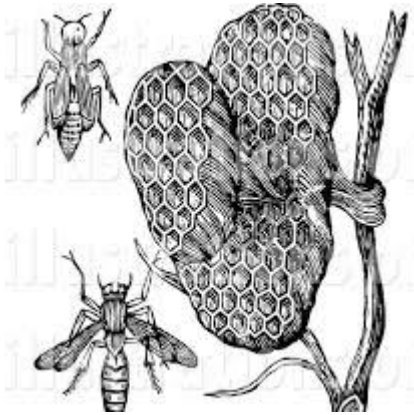
Draw some insects and the place where they live.

Insects 11
Insects that live in trees

There are many different kinds of insects in a tree.
Moths
Ants
Beetles
Wasps

Wasps build nests in trees.
They chew up little bits of wood to make a soft wet pulp. (This is like wet paper). Then they use their legs to shape the pulp. When the pulp dries they have a nest.
Wasps use team work to build their nests.

Draw a wasp's nest in a tree. Write about your drawing.



Insects 12
Helpful insects

Insects can be a pest because they eat our crops. Some insects like flies and mosquitoes spread disease.

But there are some insects that have a very special job in God's world. They help us.

Bees make honey for us to eat.
As bees gather pollen and nectar from flowers they are helping us. When they sit on the flower to gather the nectar for their babies, the pollen goes from one flower to another. That makes fruit grow. Without the pollen being spread around there would be no fruit.

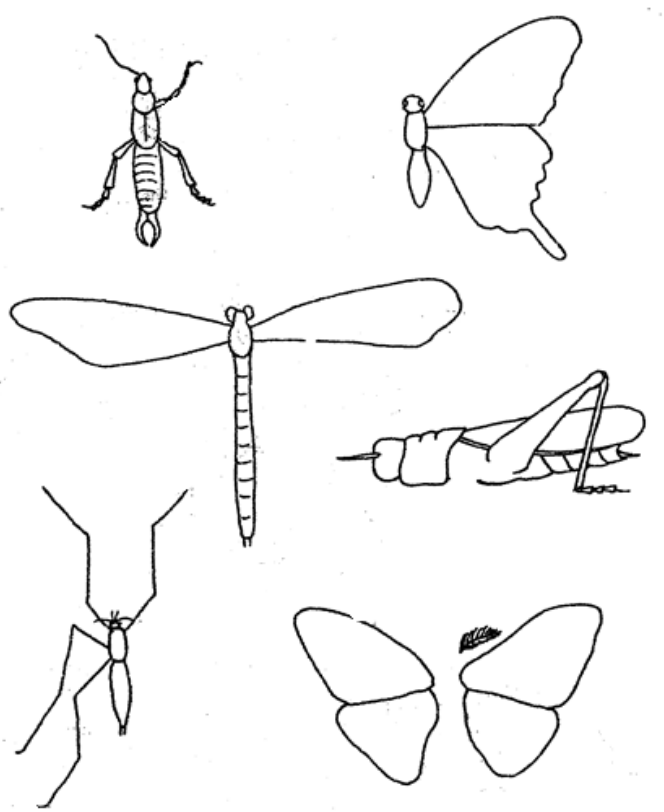
Silkworms are helpful too. The silkworm spins silk for its cocoon, where it goes to sleep before changing into a butterfly. When it has finished with its cocoon it can be used by people to make silk. Did you know that it takes 2000 cocoons to make a silk dress?

Make two lists.

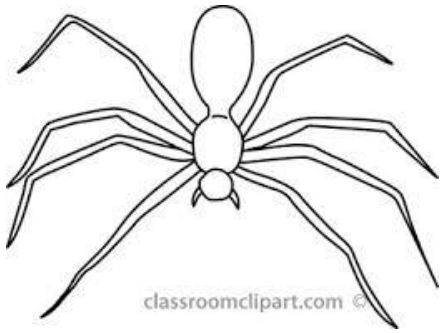
1. Harmful insects
2. Helpful insects

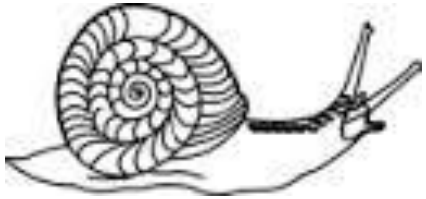
Insects 13
Some insects to draw

These insects have many parts missing. Draw each insect and put in all the missing parts. Think about the number of legs, the feelers and the wings.



Insects 14
Snails and spiders are not insects



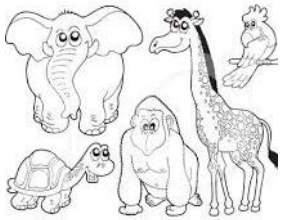


They do not have six legs.

Living Things 1

How do we know that something is living?

A living thing



- grows
- breathes
- has babies

What are the main types of living things?

- humans
- animals (mammals, birds, reptiles, frogs, mini-beasts, sea creatures, germs)
- plants

How do humans and animals grow?

- eat food
- drink water

How do plants grow?

- take in food and water through the roots and leaves

How do humans and animals breathe?

- Humans and most animals breathe through lungs.

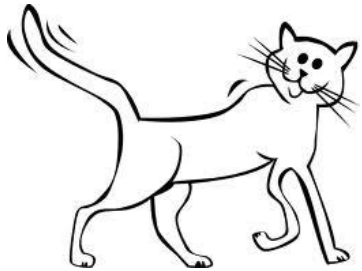
What do lungs look like?

How do plants breathe?

- take in air through small holes in the leaves

Living Things 2

What is a mammal?



Mammals are animals that

- have warm blood
- have backbones
- have babies that grow inside the mother and are born
- have babies that feed on their mother's milk
- do not lay eggs

Here are some examples of mammals:

- humans
- tigers
- cows

WAIT!

There are just two mammals that DO lay eggs!
They are from Australia.

- echidna
- platypus

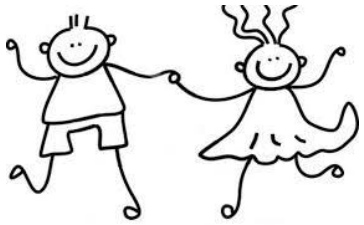
Most mammals have hair, wool or fur.

WAIT!

There are two mammals that do not have hair, wool or fur.

- whales
- dolphins

Living Things 3



Why are people special?

People are different from animals because

- we are God's special creatures
- God made us to be His friends
- God loves us more than anything else in His creation
- we can do very special things that animals cannot do
- we can talk to God and God can talk to us
- we have been told by God to look after all of His creation

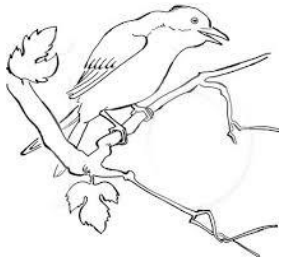
Some Bible verses from the Good News Bible:

Then God said, "And now *we* will make human beings; they will be like us. They will have power over the fish, the birds and the animals." (Genesis 1:26)
God created them male and female, he blessed them and said, "Have many children so that your children will live all over the earth. I am putting you in charge of the fish, the birds and the wild animals." (Genesis 1:27 -28)

Who made the world? (Remember that God is made up of three people – that's why the Bible says '*we* will make human beings'.

What can we do to look after God's creation?

Living Things 4



About birds

What makes a bird a bird?

- has warm blood
- lays eggs
- makes a nest
- keeps its eggs warm
- has a backbone
- has wings
- can fly

WAIT!
A few birds have wings but cannot fly:

- emus from Australia
- ostriches from Africa
- kiwis from New Zealand
- penguins

What do birds eat?

- some eat only seeds.
- some eat insects and worms
- some eat fish or small animals

What kinds of birds live in your area?
What different kinds of beaks do they have?
What kind of nests do they make?
What do they eat? **How can birds fly?**

Living Things 5

About reptiles

What makes a reptile a reptile?

- cold blooded
- breathes with lungs
- has a backbone
- lays eggs
- has scales on the skin

Which reptiles crawl on short legs?

- lizards
- alligators
- crocodiles
- turtles and tortoises
- chameleons

Which reptiles crawl with no legs?

- snakes

How do tortoises and turtles protect themselves?

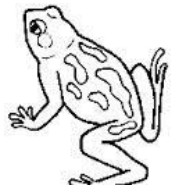
Why do reptiles like to lie in the sun?

How do reptiles survive when it is cold?

- hibernate (go to sleep)

Living Things 6

What is an amphibian?



- lives on land some of the time and in water some of the time
- lays eggs
- babies hatch in water

Frogs and salamanders are amphibians.

Find out what kind of frogs live in your area.
What do frogs eggs look like?
What do they hatch into?

- tadpoles

How do tadpoles breathe?

- They breathe underwater with gills, like fish.

How do frogs breathe?

- They breathe with lungs, like we do.
- They also breathe through their skins.

How does a frog swim?

- with its legs and feet
- The feet are webbed to help it swim.

What do frogs eat?

- worms and insects
- They catch insects with their sticky tongues.

Living Things 7

About fish

How does a fish breathe?

- has gills to breathe under water

What kind of body does a fish have?

- scales on its skin
- a backbone and smaller bones
- most fish have a narrow body.
- some are streamlined to help them swim fast.

How does a fish swim?

- tail and fins

What do fish eat?

- seaweed
- insects
- shellfish
- other fish

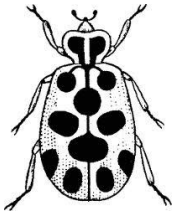
Is a fish warm blooded like a human?

- No. Fish are cold blooded like reptiles.
- Their blood is the same temperature as the water.
- Tropical fish cannot live in very cold water.

What kinds of fish live in the sea or rivers in your area?

Living Things 8

What is an insect?



- an animal
- a mini-beast with six legs

What is special about its body?

- three parts – head, chest and tail part
- the tail part is the stomach.
- insects do not have backbones but a hard covering.

Do all insects have wings?

- No

Which insects have wings?

Do ants have wings?

- only some

How do these insects help us?

- bees
- insects that eat other insects

Why are these insects a pest?

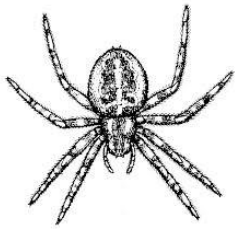
- flies
- mosquitoes

Do insects lay eggs? Yes.

Have you seen any insect eggs?

Living Things 9

About spiders



What is a spider?

- an animal
- a mini-beast with 8 legs

What is special about a spider's body?

- Two parts: head and chest together as one part; the stomach is the other part
- Spiders do not have backbones but a hard covering.

Why do spiders bite?

- to kill the insects they catch

Why do spiders spin webs?

- to catch insects

How do spiders spin webs?

- They have silk that comes from tiny holes at the tail end.

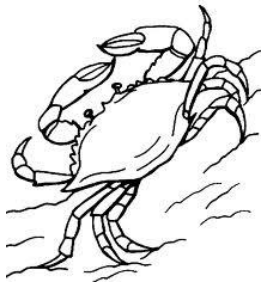
Do all spiders spin webs?

- No. Some have holes in the ground with a trap door at the top.

What kinds of spiders live in your area?
Are any of them poisonous to humans?

Living Things 10

About crabs



What is special about a crab?

- a sea creature with ten legs
- a crustacean
- front legs have claws or nippers
- does not have bones
- has a strong thick shell to protect it
- carries its eggs under its body
- breathes with gills like fish do

What does the crab use its nipper for?

- to pick up food
- to fight other crabs

What do crabs eat?

- dead fish and dead sea animals

What is special about crab's eyes?

- on the end of stalks
- can see in all directions
- can see when there is danger

How does a crab hide when there is danger?

- digs itself under the sand

*Did you know that **slaters** are in the same family as crabs?*

Living Things 11

About shellfish

Some shellfish have one shell. Some have two shells.

What is special about shellfish with one shell?

- live on rocks
- have one large foot for clinging on to the rock
- move along with its foot

What is special about shellfish with two shells?

- live in sand or mud
- have one large foot that's used to dig into the sand or mud

Which of these have one shell? Which have two shells?

- oyster
- sea snail

What do shellfish eat?

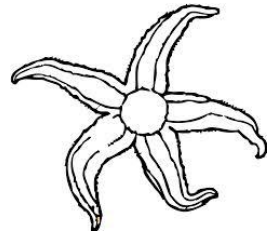
- sea weed and tiny sea plants floating in the water
- other shell fish

Do all shellfish live in the sea?

- No. Some live in rivers.

Is a land snail a shell fish?

- No, but it belongs to the same animal family.



Living Things 12

About starfish

Are starfish really fish?

- No. They are also called sea stars.

How does a starfish move?

- with many tiny feet under its arms

How does a starfish cling on to rocks?

- with its feet
- feet are suction tubes

What does a starfish eat?

- shellfish, seaweed and dead sea animals

What does a starfish use its arms for?

- to open shellfish

How does a starfish eat?

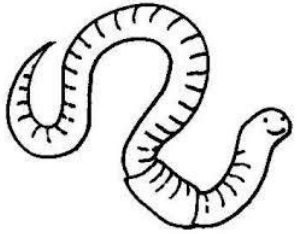
- has a mouth in the middle of its body
- mouth is on the underside

How many arms do starfish have?

- most have five but can have more

What happens if a starfish loses an arm?

- can grow another arm



Living Things 13
About earthworms

What job does the earthworm do for us?
- breaks up the soil to help our plants grow
- makes little tunnels under the soil so that the plant roots can get air

An earthworm has no eyes, ears or feelers so how does it know when there is danger about?
- feels vibrations in the earth

How does an earthworm move?
- uses bristles on his body to help it wriggle along
- stretches out long and thin, then shrinks again

What is special about an earthworm's body?
- made up of 16 sections
- has five hearts (in sections 7,8,9,10,11)

What does an earthworm eat?
- soil that has dead plants in it (compost)

How does an earthworm produce babies?
- lays eggs in a cocoon around its middle

What colours are earthworms?
- red or grey

Living Things 14
About green plants

Why are plants different to animals?
- cannot move along
- do not eat

What are the parts of a plant?
- leaves, roots, stems, flowers

How do green plants get their food?
- green parts of the plant are like a food making factory
- use air, sunlight and water to make sugar which gets stored

Why are leaves important?
- to make food for the plant
- so that the plant can breathe

What are roots for?
- to hold the plant in the ground
- to get water and nutrients for the plant

Why are stems important?
- to hold up the plant so it can get sunlight

Why are the flowers important?
- their seeds make new plants

Living Things 15

About flowering plants

What makes up the bright coloured part of the flower?

- petals

What is in the middle of the flower?

- the seed box

What is around the seed box?

- yellow stalks that have pollen on them

Seeds in the seed box need the pollen to grow. How does the pollen get into the seed box?

- Bees take it there when they feed from the flower.
- Pollen sticks to the bee's furry body.
- Sometimes wind moves it into the seed box.

Why do most flowers have bright colours?

- God gives us colour to make us happy.
- Bees can see the bright colour and go to the flower.

Why do some flowers have a strong smell?

- Bees can find the flower because of its smell.

Once pollen is in the seed box, the seeds need to find some soil to grow in. How do seeds travel? (birds, animals, wind)

What kinds of flowers grow in your area?

Living Things 16

About green plants with no flowers

Not all plants have flowers. Some plants do not need bees and flowers for their seeds to grow.

Pine trees do not have flowers.
They have cones.
When the cones are dry the seeds fall out and start new trees.

Where do pine trees grow?

Ferns do not have flowers.
Ferns have little brown spots on the back of their leaves. Seed dust comes from these spots. It falls to the ground and makes new ferns.

Where do ferns grow?

Moss does not have flowers.
It does not need seeds to grow. If you break a piece off and plant it, it will grow into a new plant.

Where does moss grow?

Living Things 17

About fungi

What colours are fungi?

- brown, red, orange, white, black, purple, pink

Fungi are not green plants so they cannot make their own food.

What do fungi need to grow?

- dead plants, dead animals or animal droppings in the soil
- water
- most don't need sunlight

What types of fungi are there?

- mushrooms, toadstools, mould, yeast and more

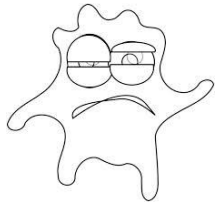
Fungi do not have flowers, so how are new fungi made?

- spores underneath drop into the soil and start a new fungi

What kinds of fungi can we eat?

What kinds of fungi are poisonous to eat?

What kinds of fungi grow in your area?



Living Things 18

About germs

What are germs?

- tiny living things that can act like plants or animals

Where do germs live?

- everywhere on the earth – even on you

Are germs good or bad?

- There are good and bad germs.
- Bad germs make you sick.
- Bad germs rot your teeth.
- Good germs can help us.
- Yoghurt is made by putting good germs into milk.

What do germs eat?

- everything that humans eat
- dead stuff, dirty stuff
- fungi

How do bad germs spread?

- flies and mosquitoes
- dirty water, dirty hands, decayed food
- dirty dishes, dish cloths and tea towels
- coughs and sneezes

How do we stop bad germs from making us sick?

Living or non-living 1

What makes something living?

Living things
Read:
What do you like most about God's creation? ….
the animals, the plants?…
or do you like the powerful forces of creation like the thunder and lightning, the sea, the mountains?

God's creation can be grouped into two types of things…**living things and non-living things.**

We can also make two more groups…**the things that God made and the things that man has made.** Of course we must remember that man can only make things out of the materials that God has provided.

What is a living thing?
Write down this definition:
Every living thing must be able to do these things, or it is not living:
1. move by itself
2. grow
3. get food and use food
4. create new beings like themselves. (reproduce)

Living or non-living 2

Let's look at animals.
All animals can move. In fact God gave animals legs, wings and fins to move with. Think about worms and snakes.
How do earthworms and snakes move?

All of these are animals:
fish
insects
bacteria

All of these can move, grow, get and eat food, and reproduce.

Human beings
If we look at the definition of a living thing, we would say that a human being is an animal. However, God said that human beings were created to be more important than any other animal. A human being is not an animal, even though we fit the definition. We can do things that animals cannot do. We can love God. We can talk to God. We can give our lives to God and follow Him. An animal cannot do this. God has told us that we must take care of the animals.

What can humans do that animals cannot do?

Living or non-living 3
Plants

What is a plant?

Answer yes or no:

1. Is a plant always green?
2. Is a mushroom a plant?
3. Can you find plants underwater?
4. Can a plant move?

If you were not sure of number 4, **yes**, a plant moves when it grows, or when a flower opens.

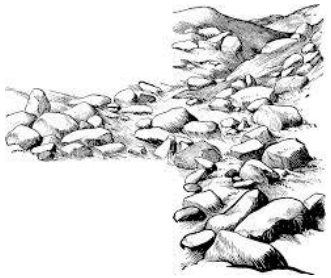
Now read about how a plant gets food.

A plant doesn't have a mouth. It doesn't chew food. However it does make its own food out of sunlight and air. It uses carbon dioxide from the air, and with the sunlight, makes its own food.

If you have seen sap from a tree, or the liquid in the stems of plants, then you have seen plant food. This is the sugary food that the plant has made for itself to keep itself alive. The plant uses sunlight and makes food in its green parts. As the plant makes food, it produces oxygen. Oxygen is helpful to people and animals, who breathe in oxygen and breathe out carbon dioxide. Plants and animals need one another. God designed it that way.

What do plants need to make food?
Which part of the plant makes food?
What does the plant give off when it makes food?
Why is oxygen useful?

Living or non-living 4
Non-living things



Non-living things…
do not breathe
do not use food
do not reproduce

Answer yes or no

1. Is a rock living?
2. Is water living?
3. Is lightening a living thing?
4. Is air living?

If you were not sure of number 4, **no**, air is not living.
None of these things are living, but God made them all. God knew exactly what living things needed when He created the earth. He created air for us to breathe, water for us to drink, heat and electricity for us to use, gravity, magnetic fields, rocks and soil.

Living things live in non-living things. Write the answers…

What living things can you find in the soil?

What living things can you find in pond water?

What living things can you find in the sea?

What non-living things are found in your house?

Living or non-living 5

Non-living things that were once living

We would say that God made a flower, but we may not say that God made perfume. We would say that perfume is man made. However, man has made perfume from something that God made.

- A flower is living
- Perfume is non-living

Finish the sentence

Here are some more non-living things that were once living. They are all made out of things that God made. Finish these sentences:
Leather is made from……

Paper comes from ……..

Woolen clothes come from……

Cotton clothes come from……...

Sausages are made from……

Take a sheet of paper and draw a line down the middle. On one side make a list of things that were ***once living.*** On the other side make a list of things that are ***now living.*** Here are some things to sort out. Add some of your own too.

bread, fresh bananas, cooked meat, cattle, grass, perfume, fresh potatoes, potato crisps, wooden chair, cotton, flowers

Living or non-living 6

Man made things from non-living materials

People make things from non-living things too. Rock and soil contain many minerals. Minerals are things like metals, crystals and precious stones.

Glass is made from sand.
Plastic is also made from minerals.

Make a list of some items in your home that are made from non-living materials.

Draw pictures of some of the non-living things that God has made.

Take a sheet of paper. Draw a line down the middle. On one side make a list of ***living things***. On the other side, make a list of ***non-living things***.
Here are some to sort out. Add some of your own too.

plants, sheep, paper, fresh apples, sausages, glass, plastic, salt, sugar, rocks, bacteria, fish, birds, insects, honey, metal, plates

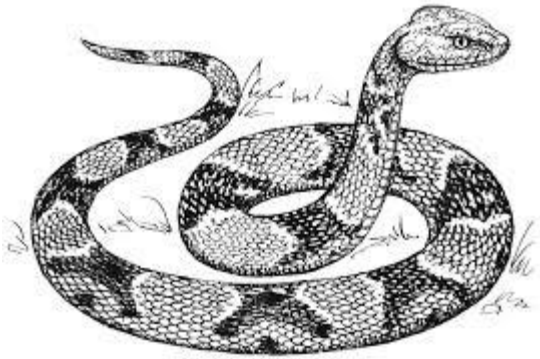
Reptiles 1
Reptiles are vertebrates

This means that they have backbones. Animals with backbones are called vertebrates.

The small bones in the backbone are called vertebrae.

Vertebrae help the reptiles to bend easily.

How many reptiles have you seen?
Snake
Lizard
Gecko
Turtle
Tortoise
Alligator
Crocodile
iguana
Chameleon

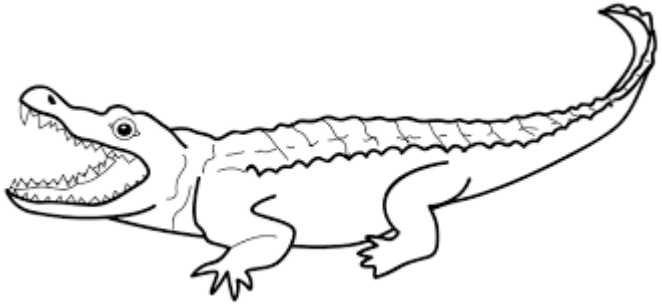


Find out which reptiles live in your area. Write a list.
Are any of them dangerous?

Reptiles 2
Reptiles are cold blooded

Their body temperatures change with the areas around them. A gecko that is too cold sits in the sun to warm up.

On a hot day, an alligator's body temperature gets very warm. It lies in the water to cool off.



Why do reptiles need to stay in a warm place?
What does an alligator do when it gets too hot?

Reptiles 3
Bodies of reptiles

Reptile bodies come in many shapes.

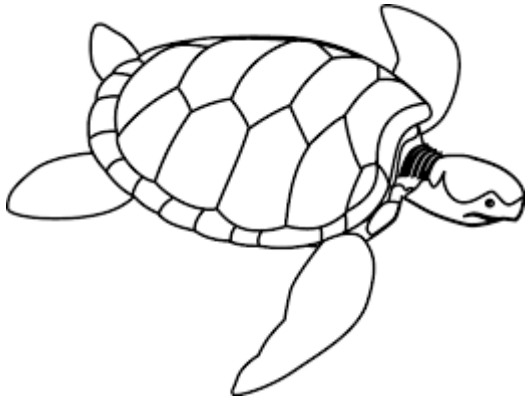
Tortoises and turtles have four legs and a short tail.
A hard shell covers their bodies.

Iguanas and other lizards have four legs and a long tail.

Crocodiles also have four legs and a tail.

Snakes are long reptiles without legs.

Draw two different kinds of reptiles and write about the differences in their bodies.

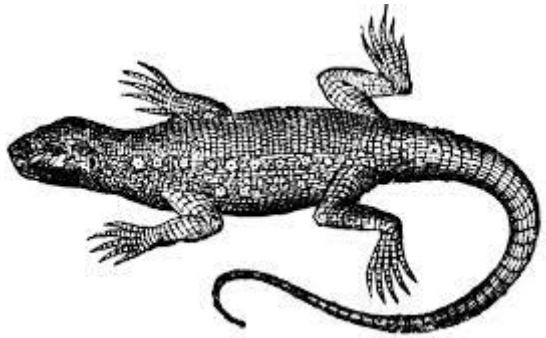


Reptiles 4
Reptiles have scales

All reptiles have hard, dry skin.

Reptiles are covered with folded pieces of hard skin called scales.

Most reptiles shed their skin. New scales grow under the old ones. The old scales fall off.



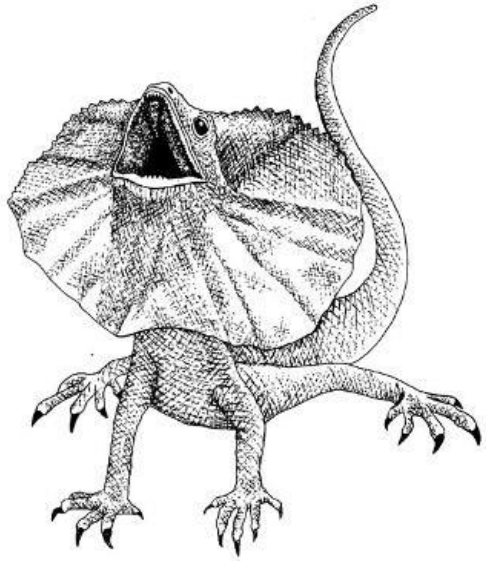
Draw a reptile showing the scales on its skin.

Reptiles 5
How reptiles breathe

Reptiles breathe air through lungs. Most reptiles have two lungs. Some snakes have only one lung. Reptiles breathe in air through their noses or mouths.

Reptiles open their mouth when they are too hot, to help them cool down.

Draw a reptile with its mouth open.



A frilled-neck lizard from Australia

Reptiles 6
What reptiles eat

Most reptiles eat meat. They eat mice, frogs and insects. Some snakes have venom in a sac in their head. When they bite their prey it becomes paralyzed.

Alligators and snakes catch prey with their teeth.

Some reptiles eat plants.
Iguanas live in central and south America. They eat flowers and fruit.

Green sea turtles eat seaweed and sea grasses.

Draw some meat eating reptiles and list their food.
Draw some plant eating reptiles and list their food.

Iguana

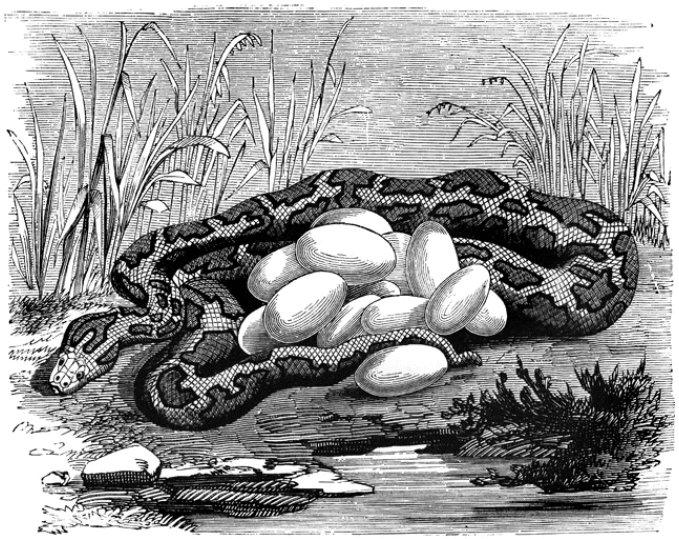
Reptiles 7
Eggs and young

Most reptiles hatch from eggs.
Turtle and alligator eggs have hard shells.
Turtles come ashore to lay their eggs. When the babies hatch they make walk to the sea. Many get eaten by birds.

Snake and lizard eggs are soft.
Some snakes and lizards are born live. Baby snakes must hunt for food as soon as they are born.

What is the difference between snake's eggs and turtle's eggs?

What are the dangers for young turtles?



Reptiles 8
The Komodo Dragon

Komodo dragons are the largest living lizards in the world. They have flat heads, bowed legs and long, thick tails. Komodos are very rare and are found in the wild only on five islands of Indonesia. One of these islands is called Komodo.

Males can grow to 3 meters in length. Females grow to 1.8 metres.

Komodos come in a variety of colors, including blue, orange, green and grey. Their skin is rough and has bony plates. They have long claws and a large, strong tail.

Komodos have good vision; they can see objects as far away as 300 metres. They are also fast. They can run for short distances up to 20 kph

They have a good sense of smell. This helps them to hunt. They are such fierce hunters they can eat very large prey, such as large water buffalo, deer, pigs and even humans. They will also eat smaller dragons. They can eat 80 percent of their body weight in one feeding

Write five facts about the Komodo dragon.

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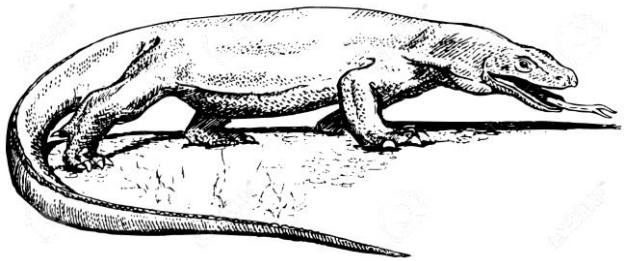


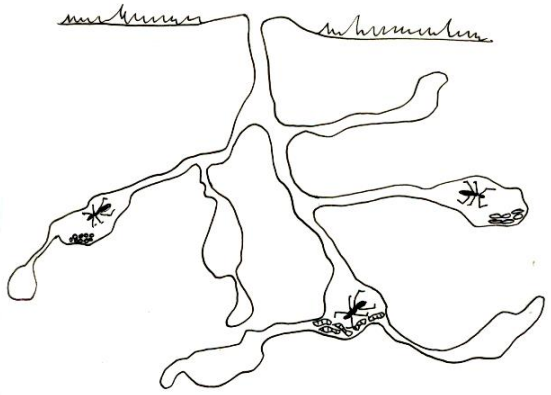
Ants 1
Ants live in colonies

Ants are called *social* insects because they never live alone. They live in family groups called *colonies.* In one ant colony there may be several thousand ants all living together in an underground nest. The nest usually has long passages leading to chambers used for rearing the young and storing food.

In an ant colony, everything is carefully planned. There are different sections for different purposes. Here are some:

- royal quarters for the queen ant
- nurseries for the babies
- food quarters where tiny insects called aphids are kept
- mushroom gardens

The rooms are built at different levels and have different degrees of warmth and dampness. When ants first hatch out of their eggs, they are little wriggly grubs called *larvae.* As these "babies" need to be kept damp to stop their skins drying out, they are kept in a damp room. However the eggs must be kept in a warm room, but not too warm, so the worker ants move the eggs to a room further underground if it is a hot day, or move them to a room closer to the surface if it is a cold day.
Draw an ant colony and write the functions of the rooms.



Ants 2
Ants teach us about wisdom

A job that has to be done in the ant colony is garbage disposal. Each worker ant is busy keeping the nest clean, taking the rubbish to the garbage tip. Ants are very wise when it comes to looking after rubbish. It is a shame that people are not so wise about their rubbish!

The ant colony is so carefully planned. Only a wonderfully wise Creator could have made the ant to be so organized. It could not have happened by accident. God has made His creatures in such a way that we can learn from them. The ant teaches us about wisdom.

Wisdom is… *knowing the right thing to do, and doing it!*

The ant can teach us how wise it is to plan and organize. Wisdom is also thinking out the best way to do something. If you have a difficult job to do, then the best way to do it is to make a plan. Decide what you will do first, next, and so on. It is good to write down the steps for getting the job done.

Ants are intelligent builders. They are able to use all kinds of materials in making their colonies. They use earth, wood, leaves, packed mud and gravel. Perhaps their favourite home is beside a rock, where they can build many underground passages, with the rock acting as a roof.

1. What do ants do to keep their nest clean?
2. What does the careful planning of the ant colony teach us?
3. Think of a difficult job that you have to do. Make a plan for doing the job. Write down the steps.
4. What kind of materials do ants use for building homes?

Ants 3

Family Members

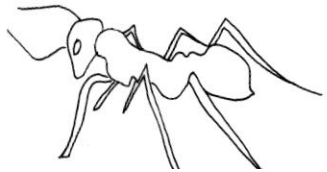
Most members of the colony are female. There may be thousands of females but only a few hundred males. The female ants are divided into different groups. There are workers, nurses, soldiers and a few queens and princesses.

Workers, nurses and soldiers

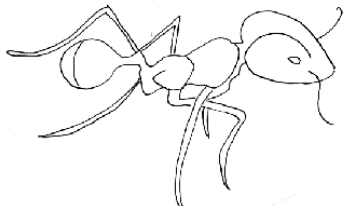
Worker ants are very busy. They look after the eggs and larvae, clean the nest, collect food and look after food storage. After the eggs have been laid by the queen, the workers take them and put them in the special chambers. The workers clean and feed the larvae. They guard the baby ants. Some of the workers repair the underground passages. Others go out and look for food. In some nests, workers open and close holes in the walls, to let more air in, or to block it out.

Nurses look after the sick or injured ants. Have you ever seen an ant carrying another ant back to the nest? The injured ants are cared for in a special hospital room.

Soldier ants can be very fierce. Some have long curved saw-toothed pincers, and a sting. They fight enemy ants from other colonies.



Worker ant



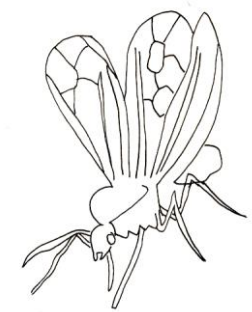
Soldier ant

Draw the worker and the soldier. Using dot points list three facts for each.

Ants 4

Queen ant and male ants

The queens and princesses, as well as all male ants are all part of the royal family! They do no work. They have everything done for them. They are fed, combed and cleaned. It is easy to pick them out from the workers, nurses and soldiers because they are the only ones with wings.



These royal ants do nothing but prepare for mating, which happens on one particular day. All the male ants make a special mating flight and mate with the queen ants. A few days after they have mated, the male ants die. The queens fly off and each one starts a new colony. The queen finds a sheltered place, digs a hole, creeps into it and seals it up with earth. Then after a few months the queen lays her eggs. The eggs are very tiny. When the eggs hatch out into larvae she feeds them with her own saliva. In her lifetime the queen will lay thousands of eggs. She will see her nest grow from a tiny hole t o a large ant city.

1. Draw the male ant and queen ant and name them.
2. Which ants have wings?
3. What happens to the males after they have mated?
4. What does the queen do after she has mated?

Ants 5

The Larva and Pupa

The moment the eggs are laid, workers carry them away to a nursery, and lick them all over until they stick to one another. Then they can be carried around in groups instead of one at a time. After about three weeks the larvae hatch out of the eggs, and they are fed until they are big enough to become pupae. Then they spin a silk cocoon around themselves and stay in the cocoon for another three weeks.

Inside the cocoons they gradually change into ants. When it is time for them to come out of the cocoon the nurses cut a hole in each cocoon and take the cocoon off the ant very carefully. The nurse licks off the tight skin around the baby ant and helps straighten out the legs.

The baby ants are light in colour at first but gradually get darker. When the baby ants venture out of the nest, they have to learn their way home, by the position of the sun, as well as following the smell of other ants from the same nest. The greatest danger to baby ants is getting lost, or wandering into another enemy ant colony by accident.

1. What do the worker ants do with the eggs once they are laid?
2. How do the baby ants get out of the cocoon?
3. What is the greatest danger to a baby ant?

Ants 6

Life cycle

Draw four pictures to show the story of how the ant develops from the egg stage to the pupae. Write a description under each drawing.

Picture 1 The eggs - These are laid by the queen.

Picture 2 The larvae - These are the hairy little grubs which hatch out of the eggs. They feed on the queen's saliva.

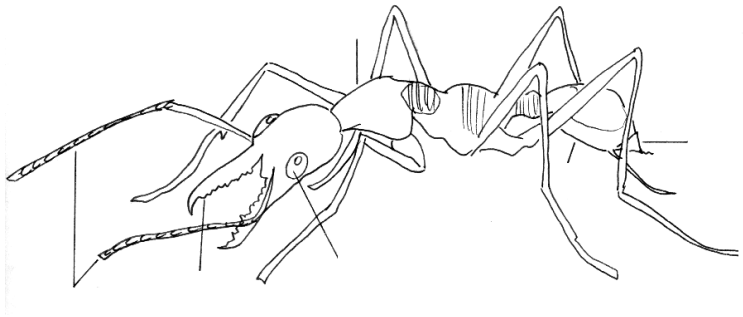
Picture 3 The cocoon - When the larva is fully grown it spins a cocoon. Inside, the larva changes into a pupa.

Picture 4 The pupae - These are the tiny ants that hatch out of the cocoon.

Ants 7

An ant's body

- Ants are insects. This means they have six legs.
- An ant's body has three parts.
- The abdomen is separate from the head and body. It has a distinct waist.
- Ants have *feelers* or *antennae* with a sharp bend in the middle.
- Ants have large jaws called *mandibles*, with tiny teeth, which are used in cutting.
- Male ants have two pairs of wings. Workers and soldiers do not have wings.
- Some ants have stings.
- Some worker ants can chase off intruders by squirting acid at their enemy.



Draw the ant and write name the parts:
antennae, jaws, compound eye, thorax (body part next to the head), abdomen (tail part) and sting (on the tail)

Ants 8

Ants teach us to plan for the future

Story: The Ant and the Grasshopper

A grasshopper was sitting in the sun singing. Nearby an ant was struggling along carrying a grain of wheat.

"Isn't it a beautiful day?" sang the grasshopper. "Why don't you sing like me?"

"I'm too busy," muttered the ant as he scurried along.
"What are you too busy about?" asked the grasshopper.

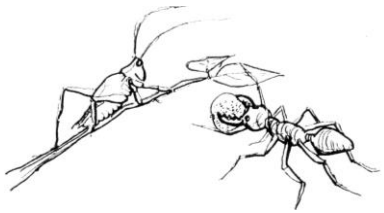
"I'm getting ready for the winter, when there will be no food about," replied the ant. Then off he went to fetch some more food.

"Well, I think you're silly," said the grasshopper as the ant returned with another grain. "As long as the sun shines I shall go on singing."

When the winter came the ant had plenty to eat but the grasshopper had nothing.

Ants, like many other creatures, prepare for the future by storing up food. They are wise little creatures because they work hard and think ahead. God says that people should learn a lesson from the ant. People can be prepared for the future by following Jesus. Then, no matter what happens in the future God will be with them. Christians can prepare for the future by storing God's word in their hearts.

Write this Bible passage:
Proverbs 6:6-8



Bees 1
Family members

Each hive has three kinds of bee:

1. **The queen bee**

She is the biggest. There is only one queen in each nest.

2. **The drones**

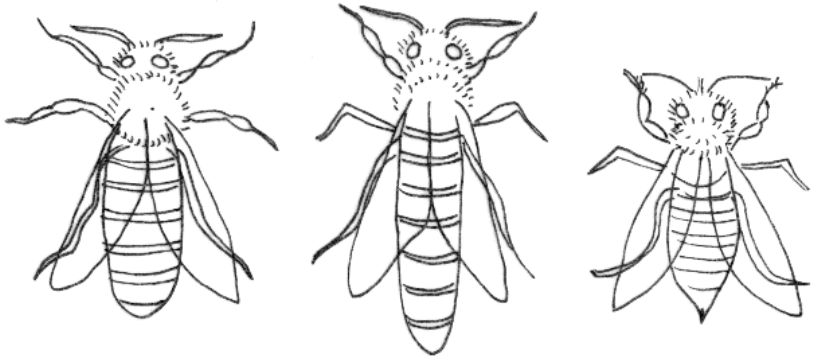
These are the males bees. They do no work at all. They are the next biggest.

3. The worker bees

These are the smallest bees. They work very hard.

When people say, *"as busy as a bee"*, they are talking about the worker bees who do so many jobs in the hive, including making the honey. Just like the ant community, the bee community is extremely well organized.

Draw and name the three types of bees in the hive.



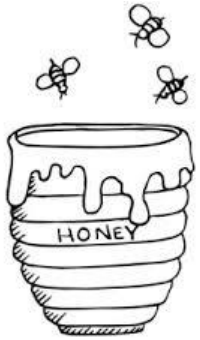
Drone Queen Worker

Bees 2
Bees help us

We can learn much from bees. We often say that a hard working person is a ‘busy bee’. Bees work hard to serve the members of the hive. They get food for each other and look after the babies.

Bees are servant insects. God has not only designed the worker bees to serve the hive, but they also serve us by pollinating the flowers. That means that they take pollen from one flower to another so that our fruit trees bear fruit. Bees also make delicious honey.

How do bees help each other in the hive?
How do bees help us?



Bees 3

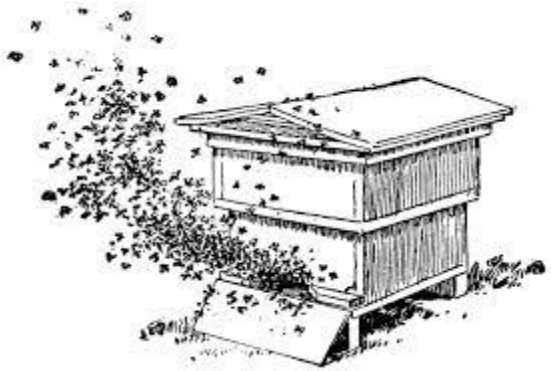
Bees work together and serve one another

In a bee community, everything runs in perfect order. Bees have no leader to tell them what to do. They just *know* what to do. God has given them instinct. This is a kind of wisdom which God gives to the animal kingdom. They just know the right thing to do and they do it.

God also gives people wisdom. We can find out the right thing to do from the Bible. However, not all people do the right thing! People can *choose* to be wise, or choose to be foolish.

.

1. Who do you know who is a hard worker?
2. Why is it good to be a hard worker?
3. God wants us to work to serve others. How can we work to serve God?
4. How does the worker bee teach us about serving?
5. How can we serve other people?

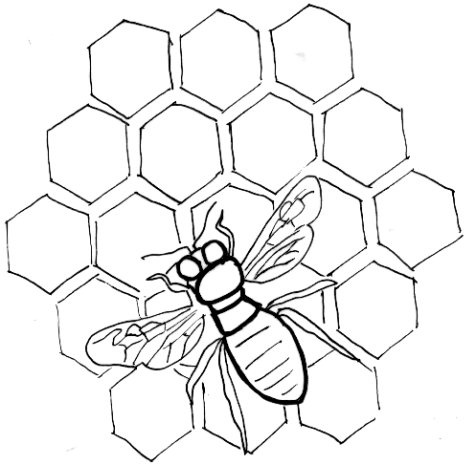


Bees 4

Jobs of the worker bees: Builders

The workers build six-sided wax cells. The six-sided cells, called hexagons, fit together like a jigsaw puzzle. The hexagon is stronger than any other shape. There are two layers of them. This is the honeycomb. The worker bees change the honey they eat into wax inside their body. They use the wax for building honeycomb. Many bees work together on one cell.

1. What is honeycomb made from?
2. How many layers are there?
3. What do worker bees eat?
4. What do they change the honey into?
5. What do they use the wax for?



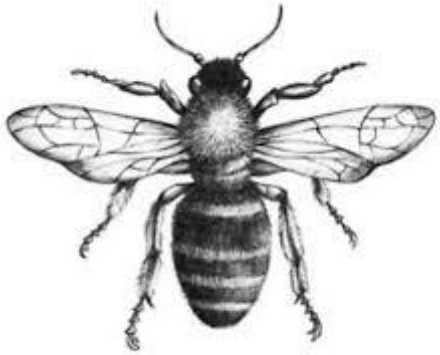
Bees 5

Jobs of the worker bees: Collecting pollen

If bees did not take collect pollen, then we would have no fruit. God designed the bees to take the pollen from the male part of the flower to the female part, so that seeds can form. Fruit forms around the seeds.
This is how the bees take the pollen from one part of the flower to another:

On the bee's body there are lots of tiny hairs. The pollen grains get caught in these. A bee's body can become covered in pollen. The bee scrapes the pollen from his body to his back legs, where there are special long hairs to hold the pollen. When he has enough pollen he returns to the hive.

1. Why do flowers need pollen?
2. What do the pollen grains get caught in?
3. Why does the bee scrape the pollen from his back legs to his front legs?
4. What does the bee do when he has enough pollen?



Bees 6

Jobs of the worker bees: Collecting nectar

In sunny weather, worker bees collect nectar from deep inside the flowers. They use their long tongue to sip the sweet thick liquid. When a bee finds nectar it does a special 'honey dance'. The bee sways her body from side to side. This sends out signals to other bees, so that they know where to come and find the nectar. Bees do not just care for themselves. They work together and help one another.

Honey bees only visit the flowers that are easy to get pollen from. Blossom is a good shape for the bee to sip nectar from. The colour and scent of the flower helps the bee to find the right one.

1. When do bees like to collect nectar?
2. What is nectar?
3. How does a bee let another bee know when it has found nectar?
4. How does a bee find the best flowers for nectar?

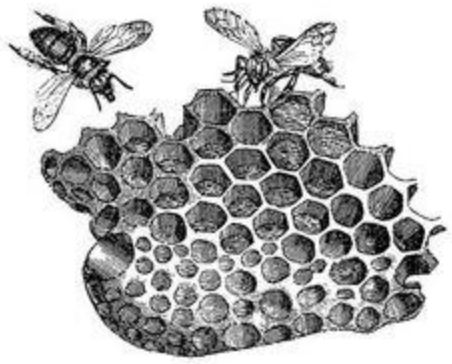
Bees 7

Jobs of the worker bees: Making honey

Bees carry the nectar back to the hive in a 'honey stomach'. While they are carrying the nectar, certain chemicals in their bodies start changing it into honey. Once they are back at the hive, they squeeze the nectar out of the honey stomach and pass it on to other worker bees. These bees pack it into the honeycomb. Honeycomb cells are six-sided (hexagons). When a cell is quite full, one of the workers closes it up with a little wax lid, keeping the honey air-tight.

The pollen is packed into other cells, and mixed with a little honey to make a kind of bread, which is used as food for the colony.

1. How do bees carry nectar back to the hive?
2. What happens to the nectar inside the bee's honey stomach?
3. What happens when the bee gets back to the hive?
4. Draw a honeycomb. Make sure the cells are six-sided.



Bees 8

Jobs of the worker bees

House Keepers

Some worker bees work at cleaning the hive. They crawl over the floor and carry out any dirt or dead bees in their jaws.

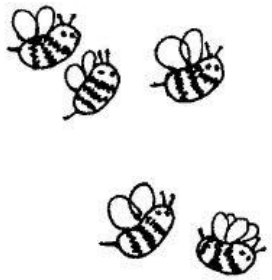
How do worker bees carry out the dirt and dead bees?

Nurses

The nurse bees look after the baby bees. The nurse bees feed the little grubs called *larvae*. They run around from cell to cell, making sure that each tiny larva is all right and that it has enough to eat.

For three days all the larvae live on *royal jelly*. Then the nurse bees feed most of them with nectar and pollen which they have collected from flowers. The pollen and nectar have been stored in the cells as *bee bread.* The queen bees are not given bee bread. They keep eating royal jelly so that they grow into queens.

1. What do the nurse bees do?
2. What is royal jelly?
3. What do larvae eat after three days?
4. What do queen bees eat all the time?



Bees 9

Jobs of the worker bees

Air Conditioners

Near the doorway of the hive stand bees that make a humming sound, but not because they are angry. They make the noise with their wings. They fan their wings very fast. This keeps the air moving and cools the hive in hot weather. It stops the honey from getting too soft and runny.

1. Why do some bees make a humming sound with their wings?
2. Why does honey need to be kept cool?

Armed Guards

The armed guards stand at the entrance of the bee hive. Bees have to pass the guards to get into the hive. The guards are armed with stings. They only let in the bees that belong to their hive. They know which ones belong because of their smell. They drive away any robber bees that may come from other colonies to steal honey.

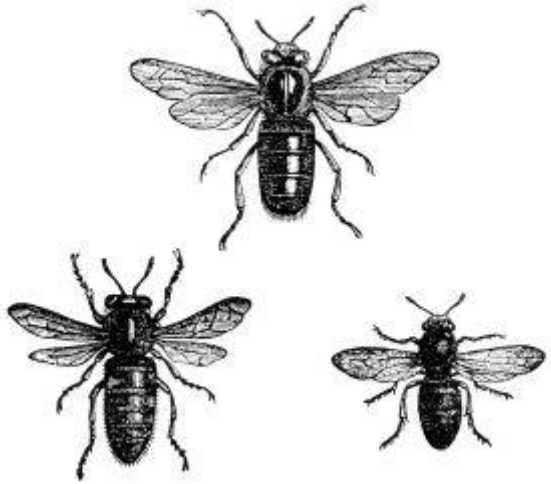
1. Where do the guards stand?
2. What is their weapon?
3. Who do the guards let into the hive?
4. Who do they keep away?

Bees 10

The Drones

The drones are very sleepy and do no work at all. They cannot gather nectar because their tongues are too short. They have no pollen baskets for gathering pollen and they have no stings. The drones are very noisy, and buzz a lot. The purpose of the drones is to mate with the new queen so that she can lay eggs. After the drones have mated with the queen, they are usually thrown out of the hive because they are useless, and only extra mouths to feed.

1. Why aren't the drones very useful?
2. Can drones sting?
3. What is the purpose of the drones in the hive?



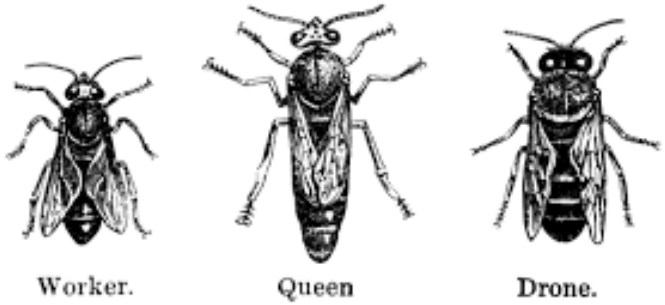
Bees 11

The Queen Bee

The queen is the most important bee in the hive. The other bees honour her and give her full attention throughout her life. She is surrounded and protected. She becomes a queen because she is fed on a special food called royal jelly. This makes her longer, bigger and shinier than the other bees. She is fed by the worker bees, who also comb the fur on her body.

A queen starts laying eggs once she has mated with a drone. The queen lays her eggs in the wax cells. She lays two kinds of eggs. One kind of egg will grow into workers and the other kind will grow into drones.

1. What does the queen look like?
2. Who looks after the queen?
3. What special attention does she receive?
4. Where does the queen lay her eggs?
5. What are the two kinds of eggs that the queen lays?

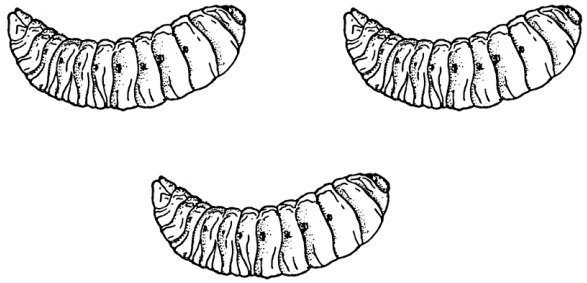


Bees 12

The larvae

The eggs hatch into small white grubs. These are called *larvae.* The nurse bees feed them on pollen and honey. After five days, they have developed into tiny bees called *pupae.* They stay in the cells for another thirteen days. Then they bite their way out of cell, by biting through the wax which covers the cell.

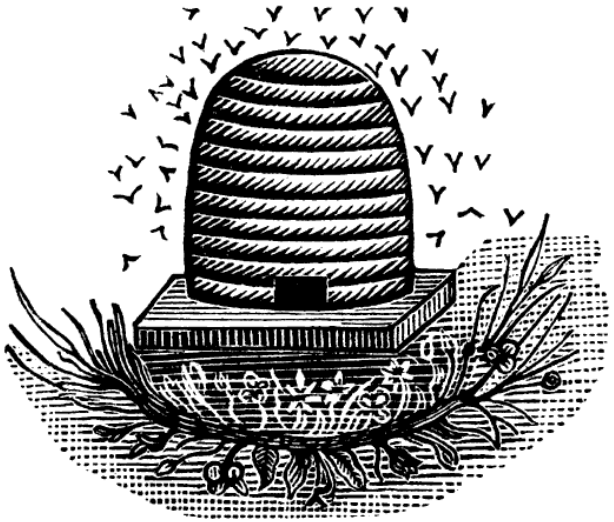
1. What are the *larvae*?
2. Who looks after them?
3. What is the total amount of time they stay in the cell after hatching?
4. How do they get out of the cell?



Bees 13
The swarm

When there are too many bees in the hive, the old queen leaves, taking many worker bees with her. Some of the worker bees scout for a new home. The swarm gathers together in a cluster on a branch before they move into their new home.

1. What happens when there are too many bees in a hive?
2. What does it mean to *scout* for a new home?
3. What does a *cluster* mean?



Bees 14
A bee's head

The head has five amazing eyes: two large ones and three small ones. As well as being able to see in all directions at once, she can see the earth and the sky at the same time. The eyes also let light through in an amazing way. Bees can see many different patterns of white, grey and black, and can actually *read* her way to flowers and back to the hive again. Because of her amazing eyes, the bee has a wonderful sense of direction.

The head also has feelers, to feel and smell. Bees also have a mouth with strong jaws for chewing and a long tongue for sipping nectar.

1. How many eyes does a bee have?
2. What is so amazing about the bee's eyes?

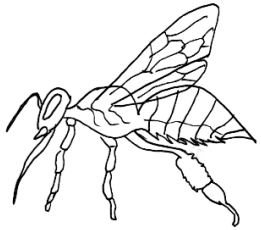
Bees 15

A bee's body

A bee is an insect. This means it has six legs. Its body is divided into three parts: the head, the thorax and the abdomen. Draw a bee and label the parts.

The thorax is the middle part of the body. It has four thin wings. There are two on each side and they can move four times a second. The tail part is the abdomen. This is the biggest part. It has a honey sac where it stores nectar.

Worker bees have stings on their tails. The sting has two spears which are joined to a red, egg-shaped bag which holds poison. Each spear has barbs on the end. These are like fish hooks. These make it very hard to pull out of the flesh. Sometimes the bee has to leave them there in order to get away. When she does this, she dies. Worker bees can usually get their stings out of other bees, but not out of a human being's skin.



1. To which part of the body are the four wings attached?
2. What is so amazing about the wings?
3. What is stored in the abdomen?
4. Which members of the bee family have stings?
5. What is the sting like? What happens if the bee loses her sting?

Bees 16

The dance of the bees

When a bee goes out looking for nectar it performs a “dance” which sends signals back to the other bees to come and get the food. They get electrical charges on their body while flying and can send out electric signals by their dance.

A bee can fly away from the hive for about 8 km and find its way back. But if they fly this far they get too tired to work. Usually they fly about 2 km (1.24 miles) from their hive looking for food.

Bees have favourite flowers for nectar: Their favourite colours are blue and yellow.

1. How does a bee tell other bees that they have found food?
2. What does this show us about God the Creator?
3. Write an amazing fact about a bee that is far away from home?
4. What colours do bees like?
5. Draw either a bee dance, or a bee on one of its favourite flowers.

Occupations 1
What is an occupation?

An **occupation** is the job that people do to earn money.

Here are some other words that we can use when talking about an occupation:

Profession: an occupation that requires special knowledge and training.

Employment: working for someone else to earn money

Self-employment: working for yourself to earn money.

Business: an occupation in which goods and services are produced, sold and exchanged for money.

Vocation: earning a living through a particular skill

1. Explain the meaning of “profession”. Now give 5 examples of a profession.
2. Explain the meaning of a “business”. Now give 5 examples of a business. Remember that a business person does not necessarily have to sell *things.* They could sell services such as advice.
3. What is the difference between being *employed* and *self-employed?*

Occupations 2
Categories of occupations

Occupations that require similar skills can be grouped together. Here are some of the groups:

Agriculture
Arts and entertainment
Computers
Construction
Design
Business
Community services
Education
Engineering
Government
Health care
Hospitality
Writing
Industry
Legal profession
Military
Religion
Sales
Sports
Transport
Tourism

Make a list called “Job categories”. Write the list down the page, and next to each category give two examples of jobs within this category.

Occupations 3
Questions about employment

1. At what age do people usually begin to work in your country?
2. A what age do people usually retire in your country?
3. Do you think women can have the same jobs as men?
4. Do you think it is more important to make a lot of money or to enjoy your job?
5. Would you like to do the same job all your life? why? Why not?
6. Do you think people over 65 can still work?
7. What are the qualities a good boss should have?
8. What makes a good job?
9. Would you like to attend a lot of meetings for your job?
10. Would you accept to work overtime? if so, would you like to be paid more or would you rather have days off?
11. Would you like to have to do a lot of paperwork?
12. Would you like to use a computer much?
13. Would you like to work with other people or would you rather work by yourself?
14. What makes a good worker?
15. Why are some jobs more popular than others?
16. What do you think is the most interesting job and what do you think is the most boring job?

Occupations 4: Match the job descriptions

1. Police Officer	a) person who drives a bus
2. Cook	b) person who teaches students
3. Waiter	c) person who makes and designs clothes
4. Fashion designer	d) works in a hospital and helps doctors
5. Movie director	e) person that can draw cartoons well
6. Pilot	f) rescues people from burning buildings and helps put out fires
7. Writer	g) person who drives a taxi
8. Cartoonist	h) someone who can sing well
9. Basketball player	i) works in a hospital and cures sick people
10. Bus driver	j) flies an aeroplane
11. Scientist	k) person who acts in a movie
12. Teacher	l) does the cooking in a restaurant
13. Journalist	m) takes people's orders in a restaurant and serves food
14. Doctor	n) person who reports news on TV, radio or newspaper
15. Nurse	o) someone who writes books and stories
16. Farmer	p) works in a laboratory and does experiments
17. Actor	q) someone who makes movies
18. Firefighter	r) person that can play basketball well
19. Singer	s) works on a farm and grows crops or looks after animals
20. Taxi driver	t) works in a police station and keeps people safe
21. Mechanic	u) person in the army who wears a uniform and has a gun
22. Engineer	w) works in an animal hospital and looks after sick animals
23. Soldier	w) repairs machines and vehicles such as cars and buses
24. Hairdresser	x) someone who designs and constructs buildings
25. Vet	y) someone who cuts and styles hair

Occupations 5

Character qualities for jobs

1. Match the words on the left with their definition on the right:

1. organized	a) waits calmly; doesn't get upset
2. energetic	b) on time
3. accurate	c) always tries to do the right thing
4. thorough	d) makes and invents new things
5. patient	e) can be trusted
6. responsible	f) hard working
7. co-operative	g) can change easily to fit in with others
8. punctual	h) works well with others
9. creative	i) is orderly; plans things carefully
10. flexible	j) eager and interested
11. reliable	k) is serious about the job
12. motivated	l) exact; without mistakes
13. disciplined	m) complete and detailed
14. committed	n) has good self-control

2. Choose four character qualities that you think are most important for being a good and reliable worker. Explain why you think these qualities are very important when working in a job.

Occupations 6

Discussion questions with a partner

Take turns to interview your partner, (one set of questions for each partner). Record the responses.

1. What's your father's job? What time does he start work?
2. What does your mother do? What time does she finish work?
3. What would you like to be when you leave school? Why?
4. Which jobs do you think pay well? Give at least 3 examples.
5. In which jobs do you have to wear a uniform? Give at least 3 examples.
6. Would you prefer a job that pays well or a job you enjoy? Explain.
7. Do you prefer working indoors or outdoors? Why? Name 3 outdoor jobs.
8. Would you like to do any of them?

1. What kind of office work does a secretary do?
2. In which jobs might you need to work evenings and weekends?
3. Which job would you never want to do? Why?
4. Which three things are most important for you in a job?
5. If you could have your own business, what would it be?
6. In your opinion, what is the most boring job in the world?
7. Who in your family or among your friends has the most interesting job? Explain why.
8. Do you think professional sports player are overpaid? Explain.

Occupations 7

Guess the occupation

1. A _____ and a _____ work in a hospital or clinic and take care of you when you are ill.
2. An _____ designs buildings.
3. A _____ keeps an office, school or hotel clean and tidy.
4. Someone who works in a school classroom and helps students is called a _____.
5. A person who works in a court and can help people on trial is called a _____.
6. Someone who cuts and styles your hair to make it look good is called a _____.
7. Someone who helps you in a shop when you want to buy something is called a _____.
8. A person who works to stop crime is a _____.
9. A _____ works at the front desk of a building and welcomes visitors and answers the phone.

Answers (jumbled order): judge; nurse; cleaner; architect; receptionist; doctor; architect; teacher; hairdresser; policeman

Now write about the job you would like to do

What job would you like to do?
What do you like about this job?
What is the hardest thing about this job?
Why do you think you are suited to this job?
What training will you need to do?
Where would you like to work? Why?

Occupations 8

Write about occupations

Choose 5 different occupations. Make a table like this and write about the duties, the personal requirements, and your opinion of the job.

Job	Duties	Requirements	Opinion
Doctor	works in a clinic or hospital and looks after sick people	responsible, reliable, caring	stressful, responsible
Fire-fighter	puts out fires	physically fit, strong, brave, responsible	risky, dangerous
Engineer	designs and constructs tools, machines	a degree or qualification in science and maths, precise	difficult, important, useful

Examples of words to use for "requirements"

energetic; organized; computer skills; good communication skills; telephone skills; can work well in a team; physically fit; works well under pressure; reliable; hardworking; honest; accurate; patient; creative; tidy; careful; flexible; calm; brave; friendly

Examples of words to use for your "opinion"

well-paid; creative; demanding; dirty; badly paid; difficult; challenging; stressful; boring; easy; dangerous; requires hard work; interesting; repetitive; rewarding; useful

History of shelter 1

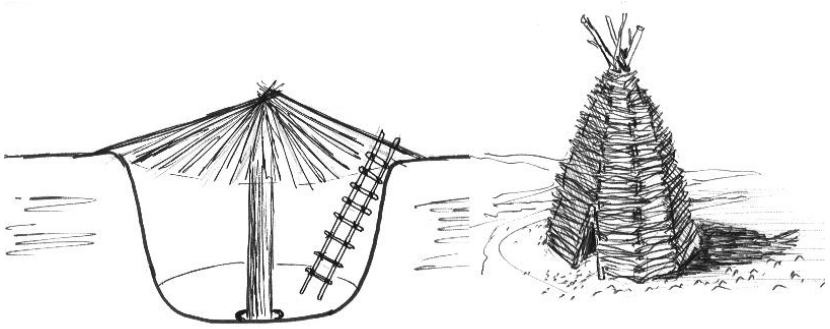
The First Homes

Most people, who do not believe the Bible, imagine that the first people were a kind of half man, half ape, living in caves and having little intelligence. However, Christians know that there were never such beings as ape-men, and that people were created with the same intelligence that people have today.

It is true that some people did live in caves because we see their paintings on the walls, but these people as intelligent as people today. Early people were also able to build structures out of the materials they found around them. Noah, who lived on earth 1500 years after the creation, was capable of building a huge and wonderful boat, capable of staying afloat for 40 days. The people of Babel, who we read about in Genesis 11, were capable of building an enormous tower.

Archaeologists are people who look for things from the past. Some have found remains of early types of dwellings. They have found evidence that people in early times built pit dwellings. To make pit dwellings, holes were dug in the ground and covered with logs, placed horizontally over the hole. Then earth was heaped on top.

Remains of other types of dwellings have also been found. It seems that in early times, people used materials like wooden posts, reeds, leaves, mud and animal skins.
Draw and label 3 types of early homes.



History of Shelter 2

Desert homes

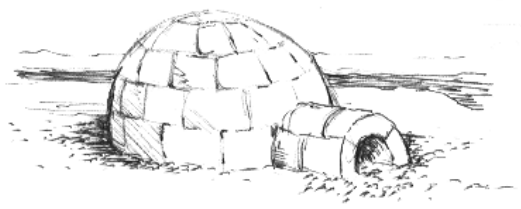
Desert homes must perform two functions. They shield the interior from intense daily heat, and must also store that heat for use during the cool nights. The best material for this is heavy clay or mud, moulded and baked into bricks. Mud bricks slowly absorb the sun's rays during the day, preventing the heat from penetrating the interior of the home. Then, during the cold night, the warm bricks radiate their stored heat and keep the interior warm. There is evidence that mud bricks were used in hot desert areas all around the world.

Another type of desert home is the tent. Tents were used by nomadic people. These are people who move around from place to place. A tent can be taken with you wherever you go. The desert tents, like those of the Arabs, usually have broad canopies over the doorways, to lessen the effects of the sun and wind. Tents were originally made from animal hides which were sewn together. Tents were used by many people around the world, including the American Indians.

1. Why are mud bricks such an effective form of shelter in desert regions?
2. Why were tents a suitable form of shelter for nomadic people?
3. Draw a tent belonging to an Arab from a nomadic tribe. Label your drawing to show the main parts of the tent and the materials used.
4. Compare a camping tent of today with traditional tents. What do they have in common?

History of Shelter 3

Eskimo homes



Eskimos live in the arctic, in the far north of the world. The arctic climate is harsher than any climate in the world. The only building material available to traditional Eskimos was the snow itself. The Eskimos, using a semi-circular snow knife, cut long flat blocks of snow and arranged them in an ascending spiral, that became smaller and smaller at the top, forming a dome. The igloo was built from the inside. Cutting blocks from around his feet, the Eskimo would lower the floor level as the dome rose above him. When the igloo was finished, more then half was below the surface. A small tunnel was connected to the igloo. This is where the sled-dogs sheltered. A small hole was left at the top of the igloo to provide ventilation, and to allow smoke to escape.

The inside of the igloo was warm, keeping out the outside cold and wind. Seal oil-lamps provided light and warmth. Blocks of ice were cut for furniture, and covered with animal skins. The temperature of the inside of the igloo was much higher than the temperature outside. The dome shape was excellent for the arctic conditions as the howling winds only swirled around the smooth shape and did no damage.

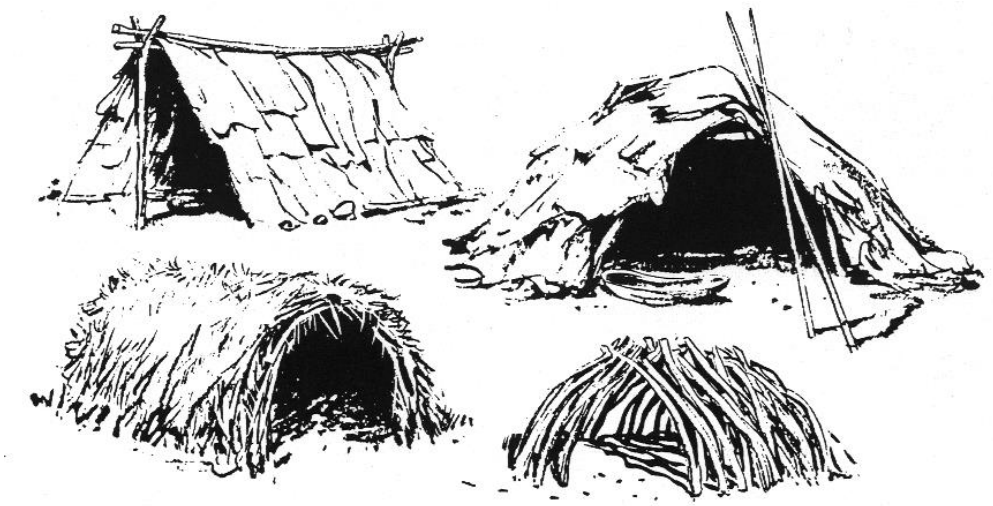
1. Draw a picture of an igloo. Include the details you have read about in the text.
2. How did the Eskimo get the floor level to be lower than the ground outside?
3. What was the small tunnel for?
4. Why was there a small hole at the top?
5. What was the igloo like inside?

History of Shelter 4

Early homes of Australian Aboriginal people

The Australian Aboriginal people moved around from place to place. They understood the land, and never mistreated it. They would never take all the food plants from one place, but left some so there were enough seeds to produce more plants. Their homes were easily built from the materials around them, like bark, grass and sticks. When they moved on, they simply built new homes. Australian Aboriginal people now live in permanent homes made of modern building materials.

Draw and write a description of some of the early Australian Aboriginal homes.



History of Shelter 5
Traditional Fijian homes

Bure is the Fijian word for a wood-and-straw hut.

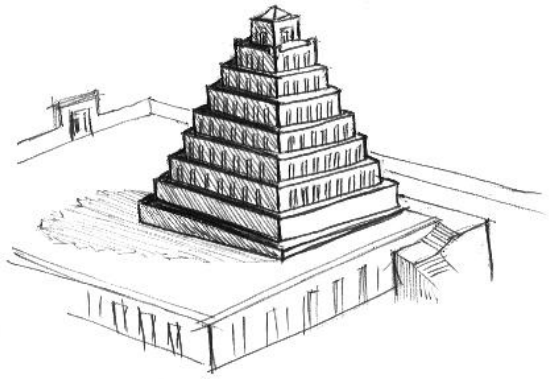
The traditional Fijian people built bures out of the materials around them. The materials were either stacked together, tied together by rope, or a both. Bures were for the men.

The other type of house was the vale. This was the family house. Both of these buildings were dark and smoky inside, often with no windows and usually only one low door. Vales had hearth pits where the women cooked. The packed earth floor was covered with grass or fern leaves and then carpeted with pandanus leaf or coconut leaf mats.

1. Make a list of 5 materials that you might use when building a bure.
2. There were no nails or screws, so how did the bures hold together?
3. Who used the bures?
4. What was the family home called?
5. What is a hearth pit?
6. Describe the floor of the vale.

History of Shelter 6

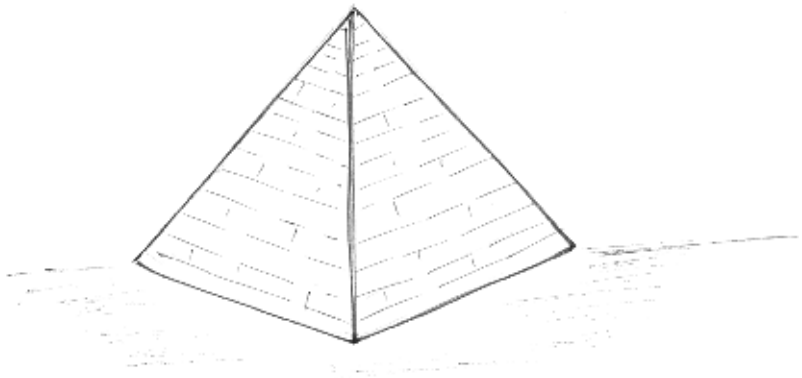
Famous buildings around the world
The Tower of Babel (Babylon, now Iraq)
You can read about this tower in Genesis 11. It was built by the descendants of Noah, who thought they were so great that they could reach heaven. God saw their proud hearts and put a stop to the building by confusing their languages. Because they suddenly spoke different languages they couldn't communicate with one another to finish the building project. It is believed that the tower was a 90 metre high stepped pyramid called a ziggurat.



1. Draw the Tower of Babel.
2. Why was the Tower of Babel built?
3. Why wasn’t it finished?

History of Shelter 7

Famous buildings around the world
The Pyramid of Giza (Egypt)
Like the people who built the tower of Babel, the Egyptians also wanted to build tall structures to get closer to heaven. The Egyptians worshiped false gods. They buried the pharaohs in the pyramids, along with their treasures, and food for their next life. Without steel or concrete, the only way of building high in ancient times was to pile stone blocks on top of one another. Slaves were used to haul the huge stone blocks. God's people, the Israelites were slaves to the Egyptian pharaoh at the time, but God chose Moses to set them free. The Great Pyramid of Giza was completed about 2550 BC and was 146 metres high.



1. Draw the pyramid of Giza
2. Why did the Egyptians bury the pharaohs with food and treasure?

History of Shelter 8

Famous buildings around the world
The Colosseum (Rome, Italy)
About 2,000 years ago, the city of Rome was at the heart of a vast empire.The Romans built huge arenas called amphitheatres. Men called gladiators fought each other or wild animals, while people watched. Sometimes Christans were put in the arena with wild animals. The Colosseum, in Rome, was the biggest amphitheatre they built. It had room for about 50,000 people. The Romans sometimes flooded the Colosseum and watched ships fighting each other in sea battles.

The Colosseum had three layers of arches and the arena was oval shaped. There were about 80 entrances, and tickets had the right entrance number stamped on them. Slaves and women sat on wooden benches at the back. The other seats were marble.

1. Draw the Colosseum.
2. What was it used for?
3. What did the Roman government do to Christians?

History of Shelter 9
Famous buildings around the world

The leaning tower of Pisa (Italy)
The 55 metre high leaning tower of Pisa in Italy was built between 1174 and 1350. Unfortunately it was built on soft ground without proper foundations. As a result, the soil has settled unevenly, making the tower lean about 5 metres towards the ground.

1. Draw the leaning tower of Pisa.
2. Why is it leaning?

History of Shelter 10
Famous buildings around the world

The Eiffel Tower (Paris, France)
Alexandre Gustave Eiffel, a French engineer, was one of the first to realise the great possibilities that iron had in building. Using iron was the first step to building skyscrapers. Eiffel made the highest iron building ever, for the Paris exhibition in 1889. It was 300 metres tall.

1. Draw the Eiffel Tower
2. Why was the Eiffel tower built?
3. What was it made from?
4. What did people learn from the building of the Eiffel Tower?

History of Shelter 11
Some important building structures

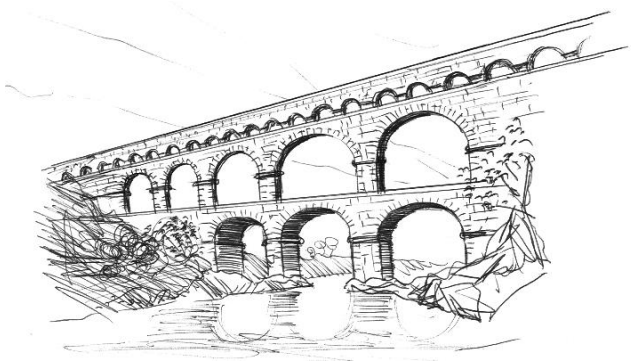
Engineers are people who work out the strength of a building. They must understand the strength of the materials and the forces that will make a building stay upright. Bridges, towers, domes, arches are some of the structures built by engineers.

Arches
The Romans were the first to use the arch. They put an arch shaped wooden frame on top of two stone pillars. Stones were tightly packed together around the frame. Sometimes a wedge-shaped stone at the top held the other stones in place. This was called a **keystone**.

The arch is a very strong shape. It can support a heavier weight than a post and beam.

The Romans also used arches for strength in the building of aqueducts. An aqueduct is a canal built on top of a bridge made of arches. The series of arches support the canal of water above.

1. Why do builders use arches?
2. Draw pictures of buildings that have arches.



History of Shelter 12
Some important building structures

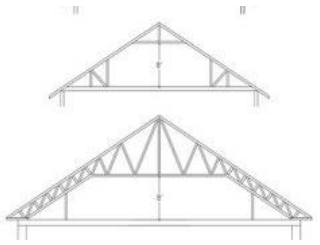
Roof frames
Making a strong waterproof roof can be the most difficult part of building a house. Flat roofs often leak. A sloping roof works better because the water runs off, but the roof must be strong enough to support the weight and stand up to high winds.

Triangles
If we look around us, we will see that many structures are triangular in design. Unlike the square frame, the triangular frame is rigid and will not change its shape.

Domes
It was the Romans who learned to make domes. They made a frame from wood and poured concrete over the wooden moulds. When the mixture dried, the framework was taken down.

The top of the dome was made of a slightly different mixture to make it lighter. At the top of the dome was a window called the *eye.* The dome was very strong.

1. Draw and describe the best kind of roof to keep the rain off.
2. Draw a building with a dome shaped roof.
3. What are some dome-shaped things that we use?



Gravity and pendulums 1

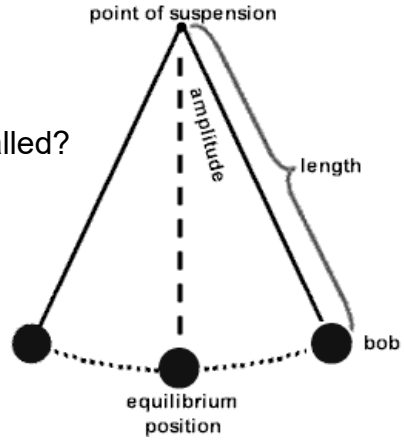
What is a pendulum?

A *pendulum* is a weight suspended on a string (or wire) so that it can swing freely. The weight is called a ‘bob’. When a pendulum is set into motion sideways from its resting position it will always go back to its resting position. The bob goes back to the resting position because of the force of gravity.

The resting position is called ‘the point is equilibrium’. To get back to its point of equilibrium the pendulum swings back and forth. This is called ‘oscillation’. We say that the swinging pendulum is ‘oscillating’. The distance the pendulum covers while oscillating is called ‘amplitude’.

The time for one complete cycle, (a left swing and a right swing), is called the *period*. The time for one complete period depends on the length of the string.

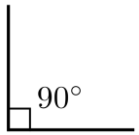
1. What is a ‘bob’?
2. What is the ‘resting position’ called?
3. What does ‘oscillating’ mean?
4. What is a period?



Gravity and pendulums 2

The earth’s gravity and pendulums

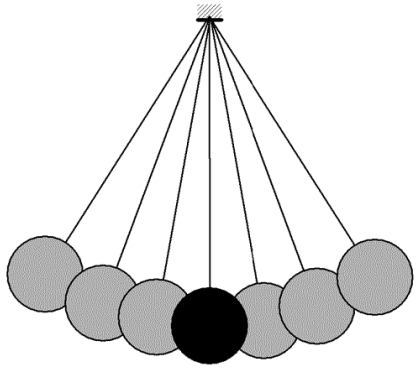
The Earth's gravity attracts the ‘bob’ of the pendulum. When the bob is hanging still, the string is hanging straight down at a 90-degree angle to the Earth. This is because gravity is pulling the string and the bob to the Earth. The pendulum will stay there at rest until a force causes it to move.



When the pendulum is set into motion, it keeps moving, unless there is a force that acts to make it stop.

Gravity works on the pendulum while it is moving. The force of the movement becomes less as the force of gravity acts on the pendulum. The pendulum slows down. Finally the bob returns to the starting point and the pendulum is still once again. The force of gravity pulls the pendulum down toward the Earth.

Why does a swinging pendulum finally stop?



Gravity and pendulums 3

What are pendulums used for?

Pendulums are used to regulate pendulum clocks, and are used in scientific instruments such as accelerometers, (which measure how fast things go), and seismometers, (which measure the strength of earthquakes). The word 'pendulum' comes from the Latin word *pendulus*, meaning 'hanging'. A swing is a pendulum. A Tarzan rope is a pendulum.

Task

Draw and label some things that work on the principle of the pendulum.

How do you make a pendulum?

A simple pendulum can be made with a string and a weight hung from a single point. Other material can be used for the string, such as a rod or wire.

Task

Draw a pendulum that you could make.

Gravity and pendulums 4

Do pendulums with different bobs swing at different rates?

The weight, (the bob), can be of any weight. It doesn't matter if the bob is heavy or light. Gravity will cause pendulums to swing at the same rate. However other forces such as wind or pushing can vary the rate. Think of a swing. If you lift the swing and let it go, and then walk away, it will act as a pendulum and gradually come to a stop. But if someone pushes the swing then it may go higher, depending on the strength of the push.

Task

Why do pendulums swing at the same rate?

What could vary the rate?

Gravity and pendulums 5

Who discovered the law of the pendulum?

The science of the way pendulums swing was discovered by Galileo Galilei in 1602. As a result of Galileo's discovery, pendulums were used for accurate timekeeping technology until the 1930s. Galileo Galilei was born in Pisa, Italy on February 15, 1564. He was the oldest of seven children. His father was a musician and wool trader. In those days parents often chose the occupation their children would follow.

His father wanted him to become a doctor so that he could earn a lot of money, but Galileo wanted to become a monk. A monk was someone who dedicated their life to prayer and learning about God. He went to a school that was run by monks and here he developed a strong faith in God and marveled at the creation…especially the mathematical laws that held the universe together.

Although Galileo was not able to serve God by becoming a monk, he did serve God in another way. His keen interest in science and mathematics led him to make remarkable discoveries that changed the world, including the law of the pendulum.

Who discovered the law of the pendulum?

What were pendulums used for?

Gravity and pendulums 6

Galileo's discoveries: telescope and pendulums

One of Galileo's discoveries was the telescope, which he used to prove that the earth was not the centre of the universe. He discovered that the earth and other planets in our solar system travel around the sun. This was a new idea and different to what had been previously believed. Galileo also invented the thermometer and made some important discoveries about gravity.

At age twenty, Galileo noticed a lamp swinging overhead while he was in a cathedral. Curious to find out how long it took the lamp to swing back and forth, he used his pulse to time large and small swings. Galileo discovered something that no one else had ever realized: the period of each swing was exactly the same. (The period is the time in which a pendulum takes to return to the position it was in at the beginning.)

Galileo also noticed that the period of the pendulum is not dependent on the material from which it is made or on its weight. The pendulum's period is influenced by its length alone. The longer the pendulum string, the longer its period.

What did Galileo discover about the universe?

How did Galileo become interested in pendulums?

How did he find out that pendulums have a constant period?

Gravity and pendulums 7

Galileo’s famous discovery about gravity

At the time that Galileo arrived at the University, some debate had started up on a "law of nature”, that had been believed by an earlier scientist, Aristotle. The belief was that heavier objects fell faster than lighter objects. Aristotle's word had been accepted as gospel truth, and there had been few attempts to actually test Aristotle's conclusions by actually conducting an experiment!

According to legend, Galileo decided to try. He needed to be able to drop the objects from a great height. The perfect building was nearby: the Tower of Pisa, 54 meters high. Galileo climbed up to the top of the building carrying a variety of balls of varying size and weight, and dumped them off of the top. A huge crowd of students and professors stood at ground level, eager to see the result. They all landed at the base of the building at the same time. Galileo had proved that Aristotle was wrong!

Task

What is the connection between Galileo’s discovery on the Tower of Pisa and the principle that different weights of bobs swing at the same rate?

Gravity and pendulums 8

About truth

There were many times in Galileo’s life when he had to stand up for the truth. People were not willing to change from their old ideas, that the earth was the centre of the universe. Galileo proved earlier scientists wrong with his new discoveries. Life was not easy for him and he was faced with much opposition. Christians know the God of all truth, and we can look to His book, the Bible, for truth. We will not always be popular, but God wants us to be strong in standing for the truth.

Jesus said, “You shall know the truth and my truth will set you free.” (John 8:32)

a. How do you think Galileo made such remarkable discoveries?
b. What is something that is true today, that many people do not believe?
c. How do we know the Bible is true?
d. If someone told you that you can get to heaven by following any religion you like, what would you say?
e. Read these Bible passages and write a short reflection for each one. What do these verses tell us about truth?

John 18:38; John 10:1-8; Matthew 7:13-14; John 14:5-7